SR 68/SR 95 NORTH CORRIDOR PROFILE STUDY

SR 68: SR 95 NORTH TO US 93
SR 95 NORTH: CALIFORNIA STATE LINE (COLORADO RIVER) TO NEVADA STATE LINE (COLORADO RIVER)

ADOT WORK TASK NO. MPD-0041-17
ADOT CONTRACT NO. 18-177731

DRAFT REPORT: PERFORMANCE AND NEEDS EVALUATION

AUGUST 2017

PREPARED FOR:

ARIZONA DEPARTMENT OF TRANSPORTATION

PREPARED BY:

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ACRONYMS & ABBREVIATIONS

AADT	Average Annual Daily Traffic
ABISS	Arizona Bridge Information and Storage System
ADOT	Arizona Department of Transportation
AGFD	Arizona Game and Fish Department
ASLD	Arizona State Land Department
AZTDM	Arizona Statewide Travel Demand Model
BLM	Bureau of Land Management
BQAZ	Building a Quality Arizona
CCTV	Closed Circuit Television
CR	Cracking Rating
DCR	Design Concept Report
DMS	Dynamic Message Sign
FHWA	Federal Highway Administration
FY	Fiscal Year
HCRS	Highway Condition Reporting System
HERE	Real time traffic conditions database produced by American Digital Cartography Inc.
HPMS	Highway Performance Monitoring System
I-	Interstate
IRI	International Roughness Index
ITS	Intelligent Transportation System
LCCA	Life-Cycle Cost Analysis
LOS	Level of Service
LRTP	Long-Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21st Century
MP	Milepost
MPD	Multimodal Planning Division
NB	Northbound
NPV	Net Present Value
OP	Overpass
P2P	Planning-to-Programming
PA	Project Assessment
PARA	Planning Assistance for Rural Areas
PDI	Pavement Distress Index
PES	Performance Effectiveness Score
PSR	Pavement Serviceability Rating
PTI	Planning Time Index
RTP	Regional Transportation Plan
RWIS	Road Weather Information System
SATS	Small Area Transportation Study
SB	Southbound
SERI	Species of Economic and Recreational Importance
SHSP	Strategic Highway Safety Plan
SOV	Single Occupancy Vehicle
SR	State Route
TAC	Technical Advisory Committee
TI	Traffic Interchange
TIP	Transportation Improvement Plan
TPTI	Truck Planning Time Index
TTI	Travel Time Index
TTTI	Truck Travel Time Index
UP	Underpass
USDOT	United States Department of Transportation
V/C	Volume-to-Capacity Ratio
VMT	Vehicle-Miles Travelled
WACOG	Western Arizona Council of Governments
WIM	Weigh-in-Motion

1.0 INTRODUCTION

The Arizona Department of Transportation (ADOT) is the lead agency for this Corridor Profile Study (CPS) of State Route 68 (SR 68) from State Route 95 (SR 95) North to US 93 and of SR 95 North from the California State Line (Colorado River) to the Nevada State Line (Colorado River). The study examines key performance measures relative to the SR 68/SR 95 North corridor, and the results of this performance evaluation are used to identify potential strategic improvements. The intent of the corridor profile program, and of ADOT's Planning-to-Programming (P2P) process, is to conduct performance-based planning to identify areas of need and make the most efficient use of available funding to provide an efficient transportation network.

ADOT has already conducted eleven CPS within three separate groupings or rounds.

The fourth round (Round 4) of studies began in Spring 2017, and includes:

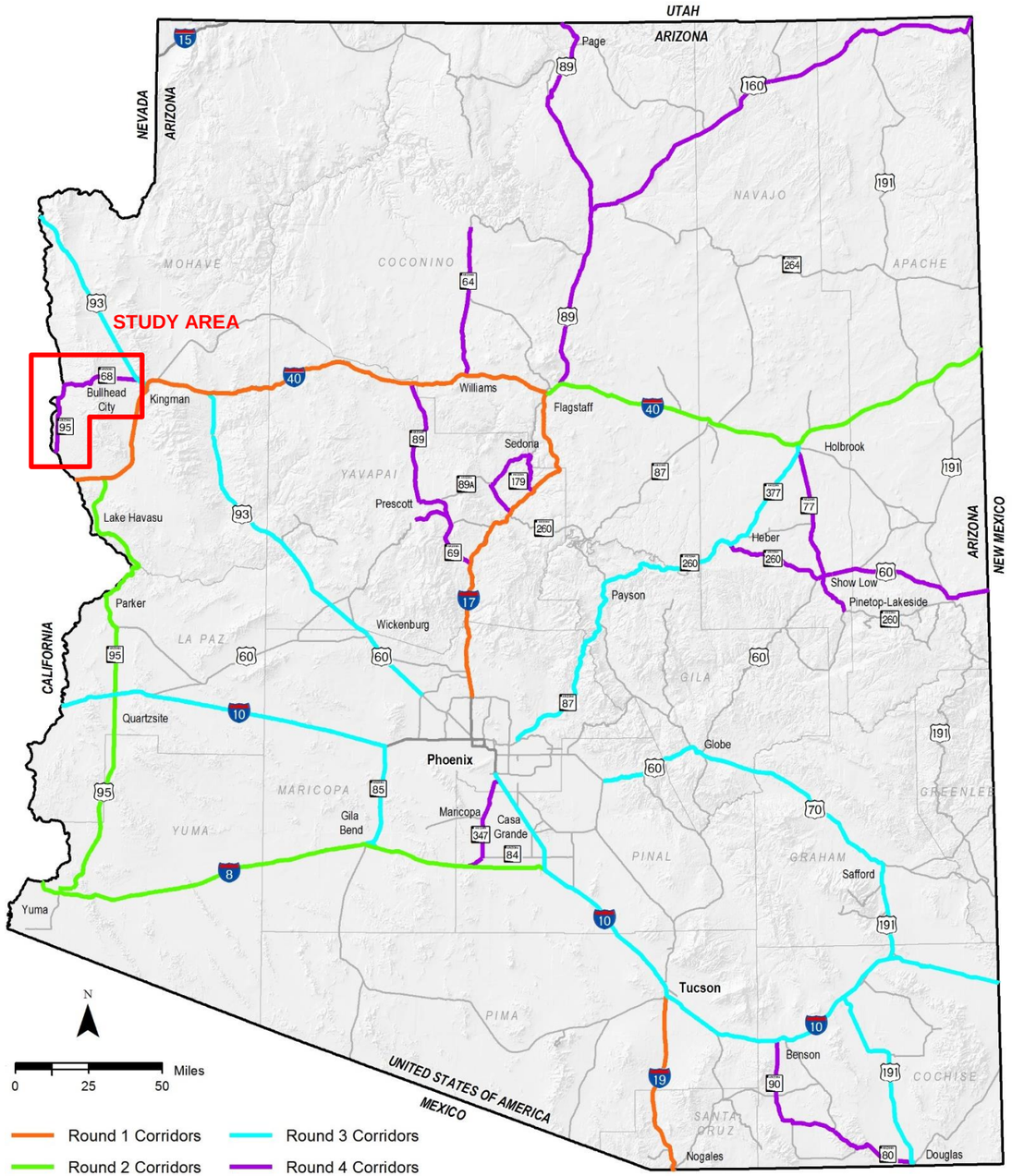
- SR 69/SR 89: I-17 to I-40
- US 89: I-40 to Utah State Line
- SR 64: I-40 to Grand Canyon National Park
- SR 179/SR 89A/SR 260: I-17 (Camp Verde) to I-17 (Montezuma Well Road)
- SR 347/SR 84: I-10 to I-8
- SR 260: SR 277 to SR 73; US 60: SR 260 to New Mexico State Line
- SR 77: US 60 to SR 377
- SR 68/SR 95: US 93 to California State Line
- US 160: US 89 to New Mexico State Line
- SR 90/SR 80: I-10 to US 191

The studies under this program assess the overall health, or performance, of the state's strategic highways. The CPS will identify candidate solutions for consideration in the Multimodal Planning Division's (MPD) P2P project prioritization process, providing information to guide corridor-specific project selection and programming decisions.

The SR 68/SR 95 North corridor, depicted in **Figure 1** along with the previous three rounds corridors**,** is one of the strategic statewide corridors identified and the subject of this Round 4 CPS.

The term "North" is appended to the name of the SR 95 section of the corridor to indicate this Round 4 CPS pertains to SR 95 north of I-40. This distinguishes it from the SR 95 (South) CPS conducted in Round 2 for SR 95 south of I-40.

Figure 1: Corridor Study Area



1.1 Corridor Study Purpose

The purpose of the CPS is to measure corridor performance to inform the development of strategic solutions that are cost-effective and account for potential risks. This purpose can be accomplished by following the process described below:

- Inventory past improvement recommendations
- Define corridor goals and objectives
- Assess existing performance based on quantifiable performance measures
- Propose various solutions to improve corridor performance
- Identify specific solutions that can provide quantifiable benefits relative to the performance measures
- Prioritize solutions for future implementation, accounting for performance effectiveness and risk analysis findings

1.2 Study Goals and Objectives

The objective of this study is to identify a recommended set of prioritized potential solutions for consideration in future construction programs, derived from a transparent, defensible, logical, and replicable process. The SR 68/SR 95 North CPS defines solutions and improvements for the corridor that are evaluated and ranked to determine which investments offer the greatest benefit to the corridor in terms of enhancing performance. Corridor benefits can be categorized by the following three investment types:

- Preservation: Activities that protect transportation infrastructure by sustaining asset condition or extending asset service life
- Modernization: Highway improvements that upgrade efficiency, functionality, and safety without adding capacity
- Expansion: Improvements that add transportation capacity through the addition of new facilities and/or services

This study identifies potential actions to improve the performance of the SR 68/SR 95 North corridor. Proposed actions are compared based on their likelihood of achieving desired performance levels, life-cycle costs, cost-effectiveness, and risk analysis to produce a prioritized list of solutions that help achieve corridor goals.

The following goals are identified as the desired outcome of this study:

- Link project decision-making and investments on key corridors to strategic goals
- Develop solutions that address identified corridor needs based on measured performance
- Prioritize improvements that cost-effectively preserve, modernize, and expand transportation infrastructure

1.3 Corridor Overview and Location

The SR 68/SR 95 North corridor between the California State Line and US 93 provides movement for freight, tourism, and recreation needs within northwestern Arizona. The corridor connects Bullhead City, the Fort Mojave Indian Tribe, and Golden Valley along with other smaller communities. This corridor also serves a number of recreational and historic areas in northwest Arizona. The SR 68/SR 95 North corridor is approximately 51 miles in length.

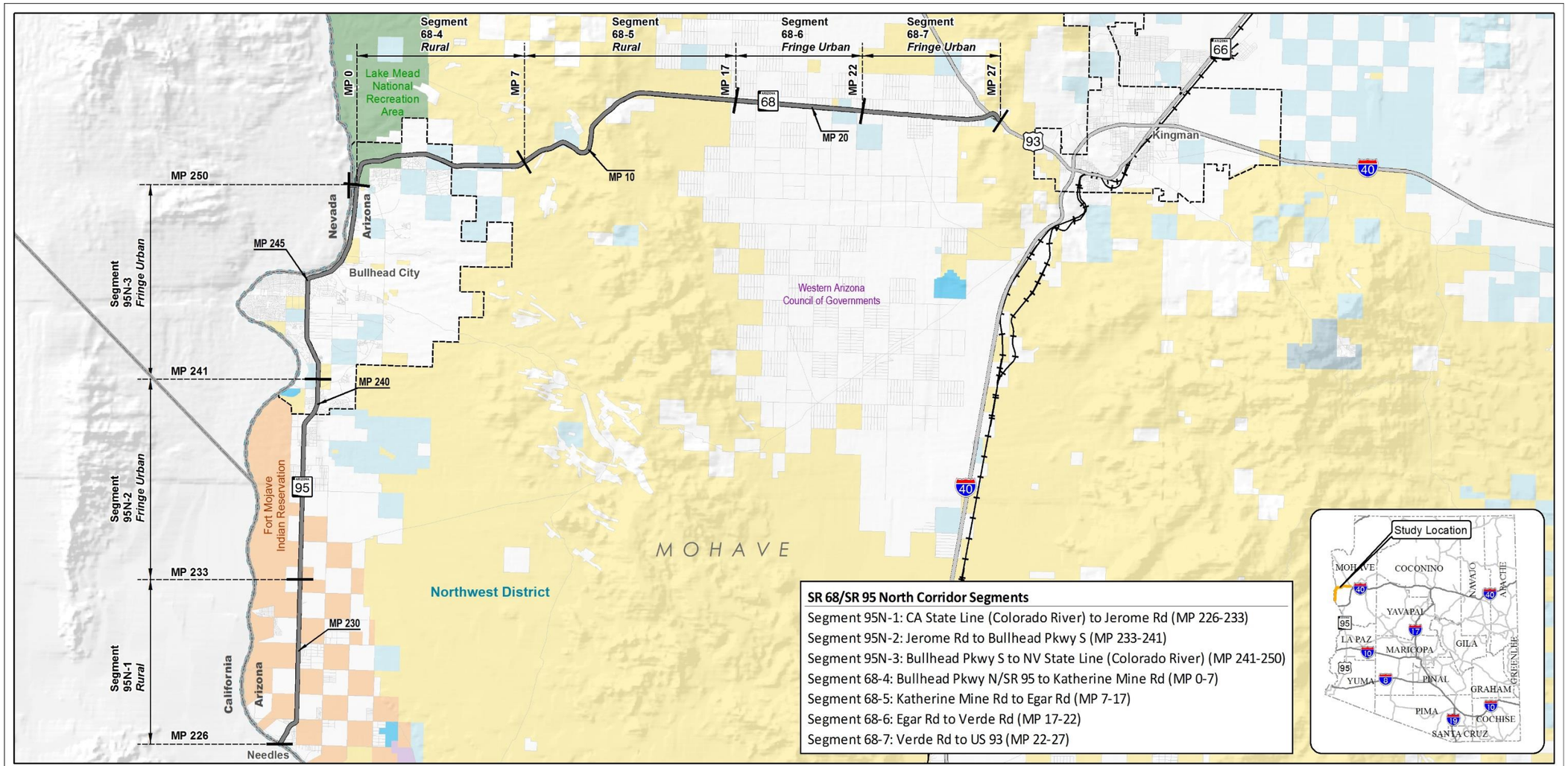
1.4 Corridor Segments

The SR 68/SR 95 North corridor is divided into 7 planning segments to allow for an appropriate level of detailed needs analysis, performance evaluation, and comparison between different segments of the corridor. The corridor is segmented at logical breaks where the context changes due to differences in characteristics such as terrain, daily traffic volumes, or roadway typical sections. Corridor segments are described in **Table 1** and shown in **Figure 2**.

Table 1: SR 68/SR 95 North Corridor Segments

Segment #	Route	Begin	End	Approx. Begin Milepost	Approx. End Milepost	Approx. Length (miles)	Typical Through Lanes (NB/EB, SB/WB)	2015/2035 Average Annual Daily Traffic Volume (vpd)	Character Description
95N-1	SR 95 North	California State Line (Colorado River)	Jerome Road	226	233	7	1,1 2,2	13,000/25,000	This rural segment has interrupted flow, numerous access points, level terrain, and is generally comprised of a four-lane undivided section. From the CA border to Courtwright Rd the roadway is a two-lane roadway (approximately 1.4 miles) and from Laguna Dr to King St the roadway has a five-lane undivided section (approximately 2.0 miles), and. There are four traffic signals located in this segment at the Courtwright Rd, Laguna Rd, Willow Dr, and King St intersections. This segment traverses the communities of Willow Valley, Arizona Village, and the Fort Mojave Indian Reservation.
95N-2	SR 95 North	Jerome Road	Bullhead Parkway South	233	241	8	2,2	24,000/38,000	This fringe urban segment has interrupted flow, numerous access points, level terrain, and is comprised of a five-lane undivided section located in the Fort Mojave Indian Reservation area. There are nine traffic signals located in this segment at the Boundary Cone Rd, Fairway Village Blvd, Lipan Blvd, Joy Ln, El Rodeo Rd, Aztec Rd, Camp Mohave Rd, Long Ave, and Bullhead Parkway South intersections.
95N-3	SR 95 North	Bullhead Parkway South	Nevada State Line (Colorado River)	241	250	9	2,2	28,000/63,000	This fringe urban segment has interrupted flow, numerous access points, level terrain, and is comprised of a five-lane undivided section located in the Bullhead City area. There are 18 traffic signals located in this segment – including one pedestrian hybrid beacon near 5th St – with designated left-turn lanes at the signalized intersections.
68-4	SR 68	Bullhead Parkway North/SR 95 North	Katherine Mine Road	0	7	7	2,2	10,000/17,000	This rural segment has interrupted flow, few access points, mountainous terrain, and is comprised of a four-lane divided section. There are two traffic signals located in this segment at the Bullhead Parkway North and McCormick Blvd intersections.
68-5	SR 68	Katherine Mine Road	Egar Road	7	17	10	2,2	8,000/10,000	This rural segment has uninterrupted flow, few access points, mountainous terrain, a curvy alignment, and is comprised of a four-lane divided section.
68-6	SR 68	Egar Road	Verde Road	17	22	5	2,2	9,000/11,000	This fringe urban segment has uninterrupted flow, numerous access points, level terrain, and is comprised of a four-lane divided section.
68-7	SR 68	Verde Road	US 93	22	27	5	2,2	11,000/12,000	This fringe urban segment has uninterrupted flow, numerous access points, level terrain, and is comprised of a five-lane undivided section located in the Golden Valley area.

Figure 2: Corridor Location and Segments



SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Project Vicinity and Segmentation

1.5 Corridor Characteristics

The SR 68/SR 95 North corridor is an important travel corridor in the northwestern part of the state. The corridor functions as a route for recreational, tourist, and regional traffic and provides critical connections between the communities it serves and the rest of the regional network.

National Context

The SR 68/SR 95 North corridor is a strategic transportation link across northwestern Arizona for recreational and intercity travel. The SR 68 portion of the corridor also serves as an alternative to US 93 for access to Las Vegas, Nevada.

Regional Connectivity

The SR 68/SR 95 North corridor between the California State Line and US 93 provides movement for tourism, recreation, and intercity travel within northwestern Arizona. The corridor is located in the ADOT Northwest District, Western Arizona Council of Governments (WACOG) planning area, and in Mohave County. Within the corridor study limits, SR 68 offers connection to US 93 while SR 95 North offers connection to I-40 through Needles, California. This corridor serves Bullhead City and the unincorporated communities of Arizona Village, Willow Valley, Fort Mohave, and Golden Valley, as well as the Fort Mojave Indian Reservation.

Commercial Truck Traffic

Communities along the SR 68/SR 95 North corridor are dependent on the corridor to access the state economy through freight deliveries and travel to other locations. Freight traffic (trucks) compromise from 6% to 22% of the total traffic flow on the corridor, with the highest truck percentages at the eastern end of SR 68 near US 93.

Commuter Traffic

Most commuter traffic along the SR 68/SR 95 North corridor occurs in the vicinity of Bullhead City (including neighboring Laughlin, Nevada) and between Golden Valley and Kingman. These areas are the major economic centers along the corridor. According to the most recent traffic volume maintained by ADOT, traffic volumes range from approximately 8,000 vehicles per day on portions of SR 68 to approximately 28,000 vehicles per day in the Bullhead City area.

According to the 2013 American Community Survey data from the US Census Bureau, 80% to 90% of the workforce in areas along the corridor relies on a private vehicle to get to work.

Recreation and Tourism

The SR 68/SR 95 North corridor provides access to the southern end of the Lake Mead National Recreation Area as well as to Lake Havasu State Park south of the corridor. The nearby Colorado River provides numerous outdoor activities throughout the area. Nearby is the historic Route 66 and the mining community of Oatman.

Multimodal Uses

Freight Rail

The BNSF “Transcon Corridor” connects Los Angeles with Chicago and passes through northern Arizona, paralleling I-40, just south of the SR 68/SR 95 North corridor.

Passenger Rail

Amtrak’s Southwest Chief Chicago to Los Angeles route primarily serves long-distance tourist travel, with daily service. The Southwest Chief shares track on the BNSF Transcon Corridor just south of the SR 68/SR 95 North corridor. There are passenger stations in nearby Kingman, Arizona and Needles, California.

Bicycles/Pedestrians

Opportunities for bicycle and pedestrian travel are limited in the corridor, particularly on SR 95 North for bicycles and on SR 68 for pedestrians. Bicycle traffic is permitted on the shoulder of SR 68 and SR 95 North. Effective shoulder widths are generally four feet or greater on SR 68 and less than four feet on SR 95 North for accommodating bicycles. Sidewalks are present along much of SR 95 North in Bullhead City but otherwise do not generally exist within the corridor.

Bus/Transit

Bullhead Area Transit System provides fixed route bus service and ADA paratransit service throughout Bullhead City along SR 95 North. There is a Greyhound bus stop in Bullhead City along a route servicing Las Vegas to Flagstaff.

Aviation

Laughlin/Bullhead City International Airport is a commercial service airport located in Bullhead City southeast of the junction of SR 68 and SR 95 North that is owned by Mohave County. Sun Valley Airport is a private, small plane rural airport located in Bullhead City. Eagle Airpark is a general aviation public use small airport located south of Bullhead City.

Land Ownership, Land Uses and Jurisdictions

As shown previously in **Figure 2**, the SR 68/SR 95 North corridor traverses multiple jurisdictions and land owned or manage by various entities. The southern section of SR 95 North traverses the Fort Mojave Indian Reservation. Land ownership in and surrounding Bullhead City, Fort Mohave, and Golden Valley is mainly private. Land between Bullhead City and Golden Valley is a mix of State Trust land and Bureau of Land Management (BLM) land.

Population Centers

Population centers of various sizes exist along the SR 68/SR 95 North corridor. **Table 2** provides a summary of the populations for communities along the corridor. High population growth is projected between 2010 and 2040 in the population centers along the corridor according to the Arizona State Demographer’s Office.

Table 2: Current and Future Population

Community	2010 Population	2015 Population	2040 Population	% Change 2010-2040	Total Growth
Mohave County	200,099	205,716	280,765	40%	80,666
Bullhead City	39,518	40,088	58,255	47%	18,737
Golden Valley CDP	8,368	8,708	14,863	78%	6,495
Fort Mohave CDP	14,360	14,944	30,554	113%	16,194
Willow Valley CDP	1,062	1,105	1,886	78%	824
Arizona Village CDP	946	984	1,680	78%	734
Fort Mojave Reservation and Off-Reservation Trust Land	1,004	1,045	1,278	27%	274

Source: U.S. Census, Arizona Department of Administration – Employment and Population Statistics

Major Traffic Generators

Bullhead City is the major traffic generator within the SR 68/SR 95 corridor. Other major traffic generators located outside the corridor that generate traffic within the corridor are Kingman, Arizona, Laughlin, Nevada, and the Colorado River recreational area.

Tribes

SR 95 North between milepost (MP) 227 and MP 237 traverses the Fort Mojave Indian Reservation.

Wildlife Linkages

The Arizona State Wildlife Action Plan (SWAP) provides a 10-year vision for the entire state, identifying wildlife and habitats in need of conservation, insight regarding the stressors to those resources, and actions that can be taken to alleviate those stressors. Using the Habimap Tool that creates an interactive database of information included in the SWAP, the following were identified in relation to the SR 68/SR 95 North corridor:

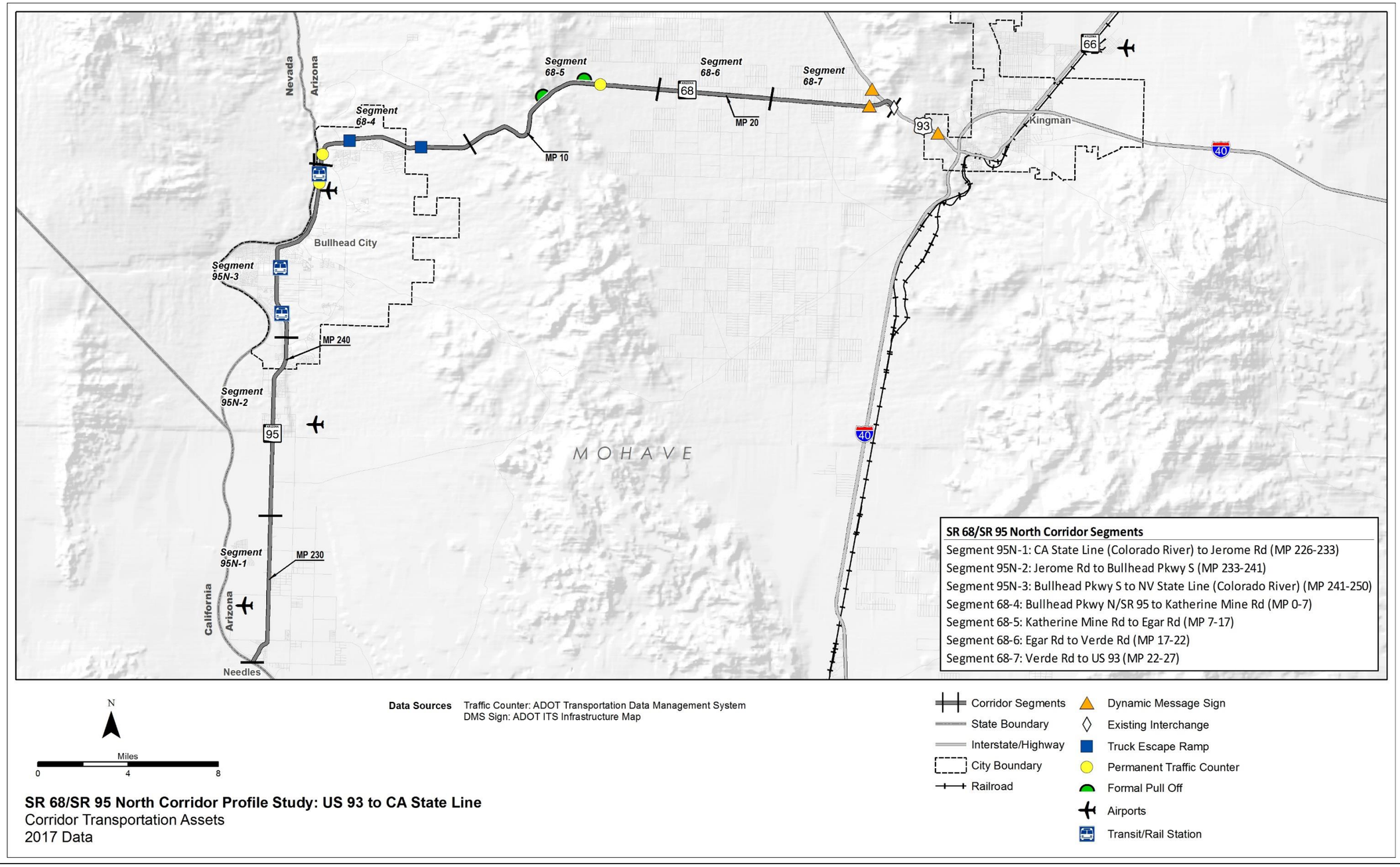
- Arizona Game and Fish Department (AGFD) Wildlife Waters are scattered throughout the Black Mountains located east of SR 95 and south of SR 68
- Arizona Important Bird Areas: The southern portion of the corridor is near the Havasu National Wildlife Refuge Important Bird Area
- The corridor travels through allotments controlled by the Arizona State Land Department (ASLD) and the BLM
- Riparian areas include a few areas adjacent to SR 95 MP 227-235 and along the Colorado River (SR 95 MP 240 to SR 68 MP 1)
- Arizona Wildlife Linkages: The corridor contains missing linkages and potential linkage zones on SR 68 MP 4-15
- According to the Species and Habitat Conservation Guide (SHCG), areas of wildlife that have low to moderate conservation potential have been identified for much of the corridor; the southern area of the SR 95 portion of the corridor has moderate to high conservation potential
- Areas within the corridor where Species of Greatest Conservation Need (SGCN) are low or moderately vulnerable are similar to the areas identified in the SHCG (see above)
- Identified areas of low or moderate levels of Species of Economic and Recreation Importance (SERI) are throughout the entire corridor

Corridor Assets

Corridor transportation assets are summarized in **Figure 3**. The corridor includes one grade-separated traffic interchange (TI) at the eastern terminus of the corridor involving SR 68 and US 93. There are no passing or climbing lanes on the corridor.

Other assets include a dynamic message sign (DMS) located on SR 68 eastbound (EB) at MP 26.4; 32 ADOT traffic signals along SR 95 North; one ADOT traffic signal on SR 68; three permanent traffic counters located on SR 95 North at MP 249.0, SR 68 MP 0.4, and SR 68 MP 14.5; a paved formal pullout located at SR 68 westbound (WB) at MP 13.9; a paved safety pullout area on SR 68 WB at MP 11.9; and two runaway truck escape ramps on SR 68 WB near MP 1.3 and MP 5.8. Bullhead Area Transit System runs routes along SR 95 North in Bullhead City.

Figure 3: Corridor Assets



SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Corridor Transportation Assets
2017 Data

1.6 Corridor Stakeholders and Input Process

A Technical Advisory Committee (TAC) was created that was comprised of representatives from key stakeholders. TAC meetings were held at key milestones to present results and obtain feedback. In addition, meetings were conducted with key stakeholders in July 2017 to present the results and obtain feedback.

Key stakeholders identified for this study included:

- ADOT Northwest District
- ADOT Technical Groups
- WACOG
- AGFD
- ASLD
- Federal Highway Administration (FHWA)

1.7 Prior Studies and Recommendations

This study identified recommendations from previous studies, plans, and preliminary design documents. Studies, plans, and programs pertinent to the SR 68/SR 95 North corridor were reviewed to understand the full context of future planning and design efforts within and around the study area. These studies are organized below into four categories: Framework and Statewide Studies, Regional Planning Studies, Planning Assistance for Rural Areas (PARAs) and Small Area Transportation Studies (SATS), and Design Concept Reports (DCRs) and Project Assessments (PAs).

Framework and Statewide Studies

- ADOT Bicycle and Pedestrian Plan Update (2013)
- ADOT Pedestrian Safety Action Plan (2017)
- ADOT Five-Year Transportation Facilities Construction Program (2018 – 2022)
- ADOT Climbing and Passing Lane Prioritization Study (2015)
- ADOT Arizona Key Commerce Corridors (2014)
- ADOT Arizona Multimodal Freight Analysis Study (2009)
- ADOT Arizona Ports of Entry Study (2013)
- ADOT Arizona State Airport Systems Plan (2008)
- ADOT Arizona State Freight Plan (2016)
- ADOT Arizona State Rail Plan (2011)
- AGFD Arizona State Wildlife Action Plan (2012) / Arizona Wildlife Linkages Assessment
- ADOT Arizona Statewide Dynamic Message Sign Master Plan (2011)
- ADOT Arizona Statewide Rail Framework Study (2010)
- ADOT Arizona Statewide Rest Area Study (2011)
- ADOT Arizona Statewide Shoulders Study (2015)
- ADOT Arizona Strategic Highway Safety Plan (2014)
- ADOT Arizona Roadway Departure Safety Implementation Plan (RDSIP) (2014)
- ADOT AASHTO U.S. Bicycle Route System (2015)
- ADOT Low Volume State Routes Study (2017)
- ADOT Statewide Transportation Planning Framework – Building a Quality Arizona (BQAZ) (2010)
- ADOT What Moves You Arizona? Long-Range Transportation Plan (2010-2035)

Regional Planning Studies

- WACOG Five-Year Transportation Improvement Program
- Mohave County General Plan (2015)
- WACOG Transportation Coordination Plan (2017-2018)

Planning Assistance for Rural Areas and Small Area Transportation Studies

- Bullhead City Transportation Plan (2011)
- Bullhead City General Plan (2016)
- Bullhead City Short Range Transit Plan (2014)
- Fort Mojave Indian Reservation Transit Study (2014)
- Golden Valley Area Plan (2002)
- SR 95 Transportation Study – Aviation Way to Teller Road (2017)

Design Concept Reports and Project Assessments

- SR 68 Golden Valley MP 14.00 to MP 27.16 – Final PA (2016)
- SR 95/Mohave Drive Southbound (SB) Right-Turn Lane – Final PA (2002)
- SR 95/Meadows Drive SB Right-Turn Lane – Final PA (2002)
- SR 95/Thunderstruck Drive SB Right-Turn Lane – Final PA (2002)
- SR 95/Marina Blvd SB Right-Turn Lane – Final PA (2002)
- FHWA Laughlin-Bullhead City Bridge Project Environmental Assessment (2010)
- SR 95 Realignment Study Final Feasibility Report (2005)

Summary of Prior Recommendations

Various studies and plans have recommended improvements to the SR 68/SR 95 corridor as shown in **Table 3** and **Figure 4**. They include, but are not limited to:

- Realigning SR 95 North to the east side of Bullhead City
- Constructing a parallel route to SR 95 North (Vanderslice Road) between Courtwright Road and Bullhead Parkway
- Constructing a new four-lane bridge and multi-use pathway over the Colorado River between Laughlin and Bullhead City

- Expanding transit service throughout Bullhead City and neighboring communities
- Implementing intersection improvements along SR 95 North such as median construction, signal improvements, and construction of turn lanes
- Constructing roundabouts, median improvements, and turn lane improvements along SR 68

Table 3: Corridor Recommendations from Previous Studies

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization[M], Expansion [E])			Status of Recommendation			Name of Study
					P	M	E	Program Year	Project No.	Environmental Documentation (Y/N)?	
SR 95											
1	8 (on I-40)	6 (on SR 68)	-	Realignment of SR 95 North between I-40 and SR 68 to the east side of Bullhead City			√	-	N/A	N	SR 95 Realignment Study – Final Feasibility Report (2005); BQAZ Statewide Transportation Planning Framework Final Report (2010)
2	226	227	1	Widen/upgrade to four travel lanes			√	-	N/A	N	BQAZ Statewide Transportation Planning Framework Final Report (2010)
3	226.0	227.3	1.3	Shoulder improvements, both directions – Tier 2 priority		√		-	N/A	N	ADOT Statewide Shoulders Study (2015)
4	N/A	N/A	-	Vanderslice Road (principal arterial): 15-mile parallel route construction to SR 95 between Courtwright Road and Bullhead Parkway			√	-	N/A	N	BQAZ Statewide Transportation Planning Framework Final Report (2010)
5	229.4	230.5	1.1	Construct sidewalks from Cottonwood Ln to Commercial St; provide a pedestrian hybrid beacon (PHB) adjacent to the casino if warranted; install intersection lighting at major intersections, assess points, and future crosswalks		√		-	N/A	N	ADOT Pedestrian Safety Action Plan (2017)
6	235.5	237.4	1.9	Construct a raised median and sidewalks along MP 235.5-237.4; provide roadway lighting along MP 235.0-237.5		√		-	N/A	N	ADOT Pedestrian Safety Action Plan (2017)
7	236.5	236.5	-	Evaluate signal operations; consider other improvements such as separating left-turn movements and pedestrian crossing with protected arrow		√		-	N/A	N	ADOT Pedestrian Safety Action Plan (2017)
8	237	238	1	Teller Lane – Aztec Road, construct raised median and roundabout at Aztec Road		√		FY2018 (Right-of-way) FY2019 (Construct)	8247/ F00560 1 R and C	N	ADOT 2018-2022 Five-Year Facility Construction Program
9	237.4	239.2	1.8	Construct sidewalks between Valencia Rd and Courtney Pl; provide roadway lighting; construct a raised median; provide a PHB between Aztec Rd and Camp Mohave Rd		√		-	N/A	N	ADOT Pedestrian Safety Action Plan (2017)
10	238	239	1	Aztec Road – Valencia Road, construct raised median and roundabout at Camp Mohave Road		√		FY2018 (Design & Right-of-way) FY2019 (Construct)	9111/F 014601 R, D, and C	N	ADOT 2018-2022 Five-Year Facility Construction Program

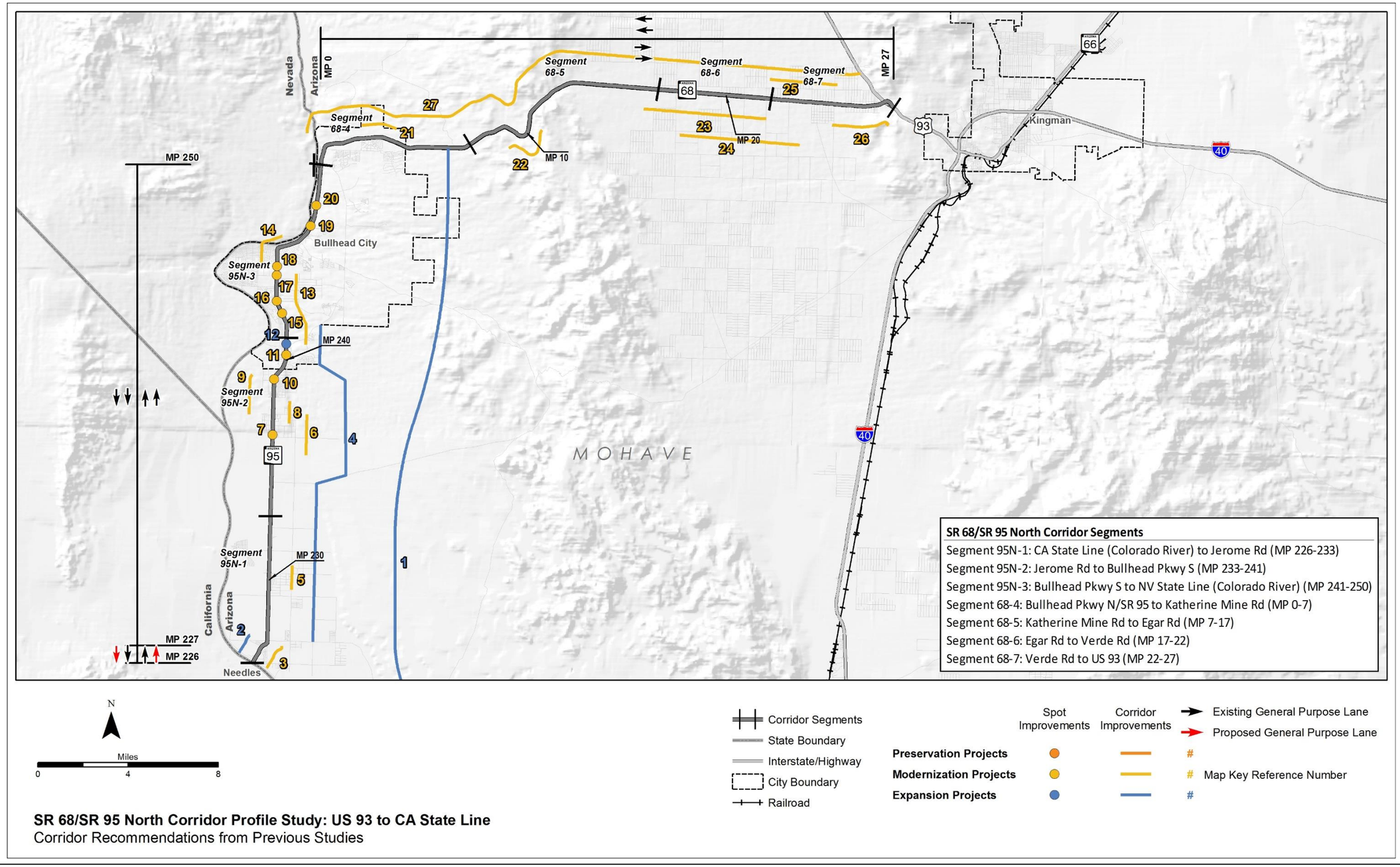
Table 3: Corridor Recommendations from Previous Studies (continued)

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E])			Status of Recommendation			Name of Study
					P	M	E	Program Year	Project No.	Environmental Documentation (Y/N)?	
11	239.9	239.9	-	Install a traffic signal at SR 95/Corwin Rd		√		-	N/A	N	Bullhead City Transportation Plan (2011)
12	240.7	240.7	-	Construct new four-lane bridge and a multi-use pathway over the Colorado River between Laughlin, NV, and Bullhead City, AZ; includes intersection improvements (four-lane approach) at Bullhead Parkway/SR 95			√	-	N/A	Y	FHWA Laughlin-Bullhead City Bridge Project Environmental Assessment (2010); BQAZ Statewide Transportation Planning Framework Final Report (2010)
13	241.5	244.0	2.5	Construct a raised median and provide a PHB between Mohave Dr and Riverview Dr; reduce curb radii at intersections where feasible		√		-	N/A	N	ADOT Pedestrian Safety Action Plan (2017)
14	244.0	246.0	2.0	Construct a raised median and provide a PHB between Hancock Rd and Ramar Rd; reduce curb radii at intersections where feasible		√		-	N/A	N	ADOT Pedestrian Safety Action Plan (2017)
15	242.2	242.2	-	Construct a SB right-turn lane on SR 95 at Meadows Dr		√		-	N/A	N	SR 95/Meadows Dr SB Right-Turn Lane, Final PA (2002)
16	242.8	242.8	-	Construct a SB right-turn lane on SR 95 at Mohave Dr		√		-	N/A	N	SR 95/Mohave Dr SB Right-Turn Lane, Final PA (2002)
17	243.9	243.9	-	Construct a SB right-turn lane on SR 95 at Marina Blvd		√		-	N/A	N	SR 95/Marina Blvd SB Right-Turn Lane, Final PA (2002)
18	244.3	244.3	-	Construct a SB right-turn lane on SR 95 at Thunderstruck Dr		√		-	N/A	N	SR 95/Thunderstruck Dr SB Right-Turn Lane, Final PA (2002)
19	N/A	N/A	-	Tri-City Connectors transit service expansion		√		-	N/A	N	BQAZ Statewide Transportation Planning Framework Final Report (2010)
20	N/A	N/A	-	Provide a minor transit center in Bullhead City		√		-	N/A	N	BQAZ Stateside Transportation Planning Framework Final Report (2010)

Table 3: Corridor Recommendations from Previous Studies (continued)

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E])			Status of Recommendation			Name of Study
					P	M	E	Program Year	Project No.	Environmental Documentation (Y/N)?	
SR 68											
21	2.0	3.5	1.5	Construct a raised median and pedestrian crossing improvements; install roadway lighting		√		-	N/A	N	ADOT Pedestrian Safety Action Plan (2017)
22	8.5	11	2.5	Design and construct safety improvements (high friction surface course)		√		FY2018 (Design), FY 2020 (Construction)	7878/D 7878/C	N	ADOT 2018-2022 Five-Year Facility Construction Program
23	16.4	21.8	5.4	Construct roundabout at Colorado Road; three indirect left-turn and median improvements at Egar Road, Estrella Road, and Teddy Roosevelt Road; one left-in only median improvement at Milky Way Road		√		-	N/A	N	SR 68 Golden Valley: MP 14.00 to MP 27.16, Final PA (2016)
24	18.0	24.3	6.3	Construct a raised median and provide roadway lighting; evaluate the need for PHB with a median refuge between Aztec Rd and Bacobi		√		-	N/A	N	ADOT Pedestrian Safety Action Plan (2017)
25	21.8	24.8	3.0	Construct three roundabouts at Verde Road, Adobe Road, and Aztec Road; two T-intersections at Marana Road and Mayer Road; new raised median improvements		√		-	N/A	N	SR 68 Golden Valley: MP 14.00 to MP 27.16, Final PA (2016)
26	24.8	27.2	2.4	Construct roundabout at Bacobi Road; new raised median improvements		√		-	N/A	N	SR 68 Golden Valley: MP 14.00 to MP 27.16, Final PA (2016)
27	0.0	26.5	26.5	Roadway departure countermeasures: • Enhanced signs and markings for curves (MPs 0.5-1.5, 4.0-4.5, 8.5-9.0, and 10.0-10.5) • Edge line rumble strips or shoulder rumble strips (MPs 4.0-4.5, 5.0-6.0, 7.5-9.0, 9.5-11.0, 13.0-13.5, 15.5-16.5, 17.0-18.0, 19.0-20.0, 21.0-22.0, 22.5-23.0, 23.5-24.0, and 25.0-26.5) • Alignment delineation, lighting (MPs 0.0-1.0, 3.0-3.5, 8.0-8.5, 15.5-16.0, 21.0-21.5, 22.5-23.0, and 25.5-26.0) • Guardrail relocation/safety enhancements (MPs 8.5-9.0 and 10.5-11.0)		√		-	N/A	N	ADOT Arizona RDSIP (2014)

Figure 4: Corridor Recommendations from Previous Studies



SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Corridor Recommendations from Previous Studies

2.0 CORRIDOR PERFORMANCE

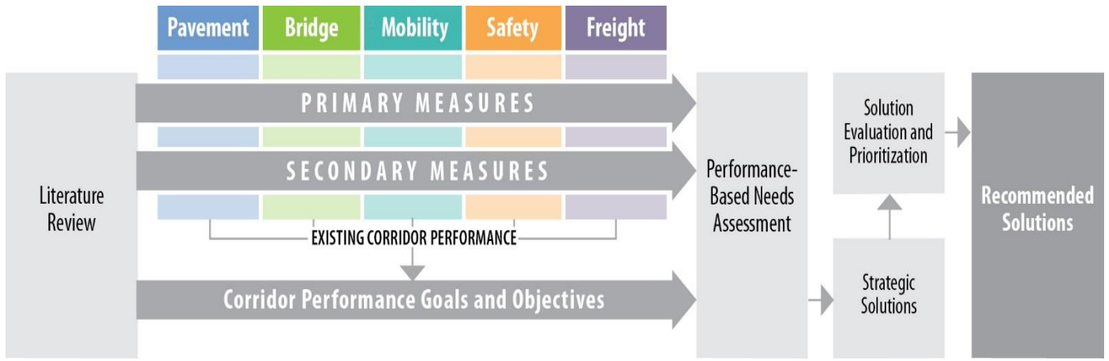
This chapter describes the evaluation of the existing performance of the SR 68/SR 95 North corridor. A series of performance measures is used to assess the corridor. The results of the performance evaluation are used to define corridor needs relative to the long-term goals and objectives for the corridor.

2.1 Corridor Performance Framework

This study uses a performance-based process to define baseline corridor performance, diagnose corridor needs, develop corridor solutions, and prioritize strategic corridor investments. In support of this objective, a framework for the performance-based process was developed through a collaborative process involving ADOT and the CPS consultant teams.

Figure 5 illustrates the performance framework, which includes a two-tiered system of performance measures (primary and secondary) to evaluate baseline performance. The primary measures in each of five performance areas are used to define the overall health of the corridor, while the secondary measures identify locations that warrant further diagnostic investigation to delineate needs. Needs are defined as the difference between baseline corridor performance and established performance objectives.

Figure 5: Corridor Profile Performance Framework



The following five performance areas guide the performance-based corridor analyses:

- Pavement
- Bridge
- Mobility
- Safety
- Freight

These performance areas reflect national performance goals stated in *Moving Ahead for Progress in the 21st Century* (MAP-21):

- Safety: To achieve a significant reduction in traffic fatalities and serious injuries on all public roads
- Infrastructure Condition: To maintain the highway infrastructure asset system in a state of good repair
- Congestion Reduction: To achieve a significant reduction in congestion on the National Highway System
- System Reliability: To improve the efficiency of the surface transportation system
- Freight Movement and Economic Vitality: To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
- Environmental Sustainability: To enhance the performance of the transportation system while protecting and enhancing the natural environment
- Reduced Project Delivery Delays: To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion

The MAP-21 performance goals were considered in the development of ADOT's P2P process, which integrates transportation planning with capital improvement programming and project delivery. Because the P2P program requires the preparation of annual transportation system performance reports using the five performance areas adopted for the CPS, consistency is achieved in the performance measures used for various ADOT analysis processes.

The performance measures include five primary measures: Pavement Index, Bridge Index, Mobility Index, Safety Index, and Freight Index. Additionally, a set of secondary performance measures provides for a more detailed analysis of corridor performance.

Each of the primary and secondary performance measures is comprised of one or more quantifiable indicators. A three-level scale was developed to standardize the performance scale across the five performance areas, with numerical thresholds specific to each performance measure:

Good/Above Average Performance – Rating is above the identified desirable/average range

Fair/Average Performance – Rating is within the identified desirable/average range

Poor/Below Average Performance – Rating is below the identified desirable/average range

Table 4 provides the complete list of primary and secondary performance measures for each of the five performance areas.

Table 4: Corridor Performance Measures

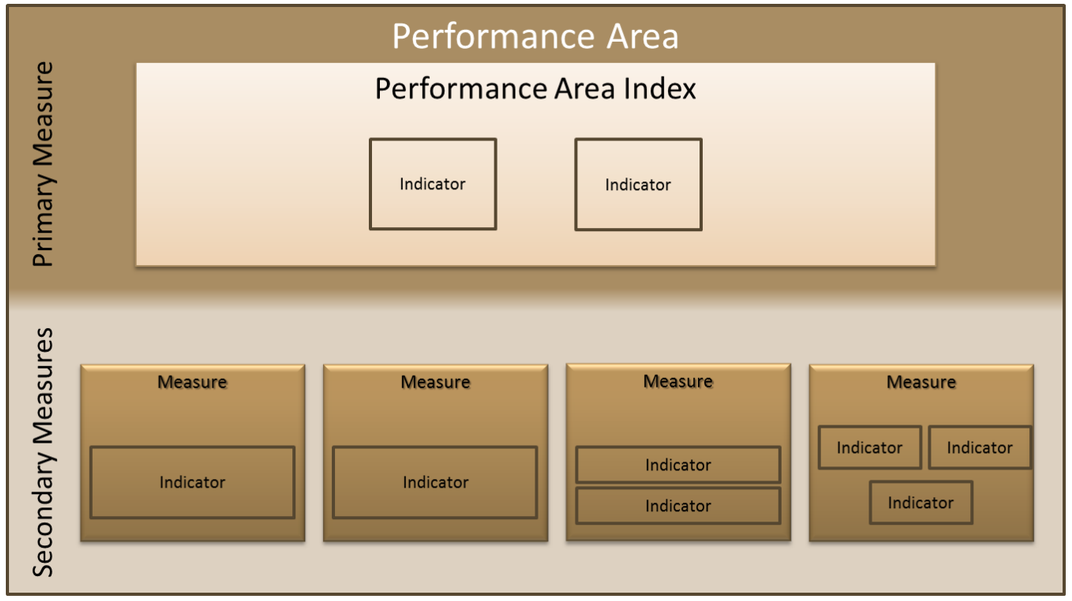
Performance Area	Primary Measure	Secondary Measures
Pavement	**Pavement Index** Based on a combination of International Roughness Index and cracking	• Directional Pavement Serviceability • Pavement Failure • Pavement Hot Spots
Bridge	**Bridge Index** Based on lowest of deck, substructure, superstructure and structural evaluation rating	• Bridge Sufficiency • Functionally Obsolete Bridges • Bridge Rating • Bridge Hot Spots
Mobility	**Mobility Index** Based on combination of existing and future daily volume-to-capacity ratios	• Future Congestion • Peak Congestion • Travel Time Reliability • Multimodal Opportunities
Safety	**Safety Index** Based on frequency of fatal and incapacitating injury crashes	• Directional Safety Index • Strategic Highway Safety Plan Emphasis Areas • Crash Unit Types • Safety Hot Spots
Freight	**Freight Index** Based on bi-directional truck planning time index	• Recurring Delay • Non-Recurring Delay • Closure Duration • Bridge Vertical Clearance • Bridge Vertical Clearance Hot Spots

The general template for each performance area is illustrated in **Figure 6**.

The guidelines for performance measure development are:

- Indicators and performance measures for each performance area should be developed for relatively homogeneous corridor segments
- Performance measures for each performance area should be tiered, consisting of primary measure(s) and secondary measure(s)
- Primary and secondary measures should assist in identifying those corridor segments that warrant in-depth diagnostic analyses to identify performance-based needs and a range of corrective actions known as solution sets
- One or more primary performance measures should be used to develop a Performance Index to communicate the overall health of a corridor and its segments for each performance area; the Performance Index should be a single numerical index that is quantifiable, repeatable, scalable, and capable of being mapped; primary performance measures should be transformed into a Performance Index using mathematical or statistical methods to combine one or more data fields from an available ADOT database
- One or more secondary performance measure indicators should be used to provide additional details to define corridor locations that warrant further diagnostic analysis; secondary performance measures may include the individual indicators used to calculate the Performance Index and/or “hot spot” features

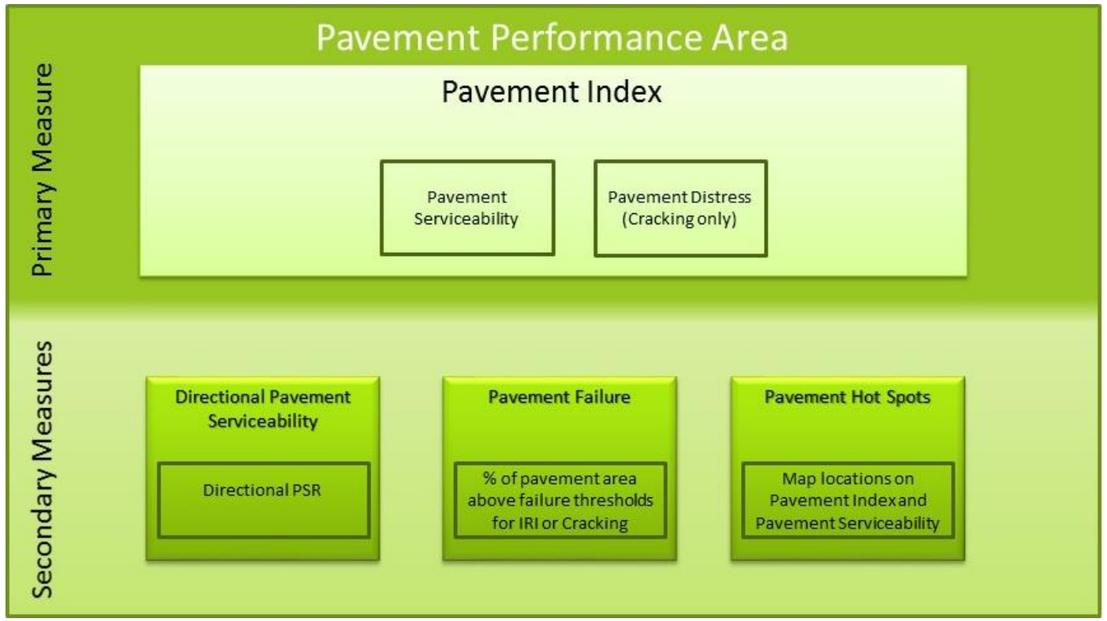
Figure 6: Performance Area Template



2.2 Pavement Performance Area

The Pavement performance area consists of a primary measure (Pavement Index) and three secondary measures, as shown in **Figure 7**. These measures assess the condition of the existing pavement along the SR 68/SR 95 North corridor. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C**.

Figure 7: Pavement Performance Measures



Primary Pavement Index

The Pavement Index is calculated using two pavement condition ratings: the Pavement Serviceability Rating (PSR) and the Pavement Distress Index (PDI).

The PSR is extracted from the International Roughness Index (IRI), a measurement of pavement roughness based on field-measured longitudinal roadway profiles. The PDI is extracted from the Cracking Rating (CR), a field-measured sample from each mile of highway.

Both the PSR and PDI use a 0 to 5 scale with 0 representing the lowest performance and 5 representing the highest. The Pavement Index for each segment is a weighted average of the directional ratings based on the number of travel lanes. Therefore, the condition of a section with more travel lanes will have a greater influence on the resulting segment Pavement Index than the condition of a section with fewer travel lanes.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the Pavement performance area, the relevant operating environments are designated as interstate and non-interstate segments. For the SR 68/SR 95 North corridor, the following operating environment was identified:

- Non-interstate: all segments

Secondary Pavement Measures

Three secondary measures provide an in-depth evaluation of the different characteristics of pavement performance.

Directional Pavement Serviceability

- Weighted average (based on number of lanes) of the PSR for the pavement in each direction of travel

Pavement Failure

- Percentage of pavement area rated above failure thresholds for IRI or Cracking

Pavement Hot Spots

- A Pavement "hot spot" exists where a given one-mile section of roadway rates as being in "poor" condition
- Highlights problem areas that may be under-represented in a segment average; this measure is recorded and mapped, but not included in the Pavement performance area rating calculations

Pavement Performance Results

The Pavement Index provides a high-level assessment of the pavement condition for the corridor and for each segment. The three secondary measures provide more detailed information to assess pavement performance.

Based on the results of this analysis, the following observations were made:

- The weighted average of the Pavement Index shows "good" overall performance for the SR 68/SR 95 North corridor
- According to the Pavement Index, two SR 95 North segments have pavement in "fair" condition while the remaining five corridor segments have pavement in "good" condition
- Pavement condition data was not available for MP 249-250 in Segment 95N-3 and for MP 21-22 in Segment 68-6; the pavement condition ratings were assumed to be the same as the adjacent mile
- Segments 95N-2 and 95N-3 show "poor" % Area Failure ratings
- The weighted average of the Directional PSR and % Area Failure shows "fair" overall performance for the SR 68/SR 95 North corridor
- Pavement hot spots along the corridor include:
  - Segment 95N-1: MP 232-233

- Segment 95N-2: MP 233-234 and MP 236-238
- Segment 95N-3: MP 248-250

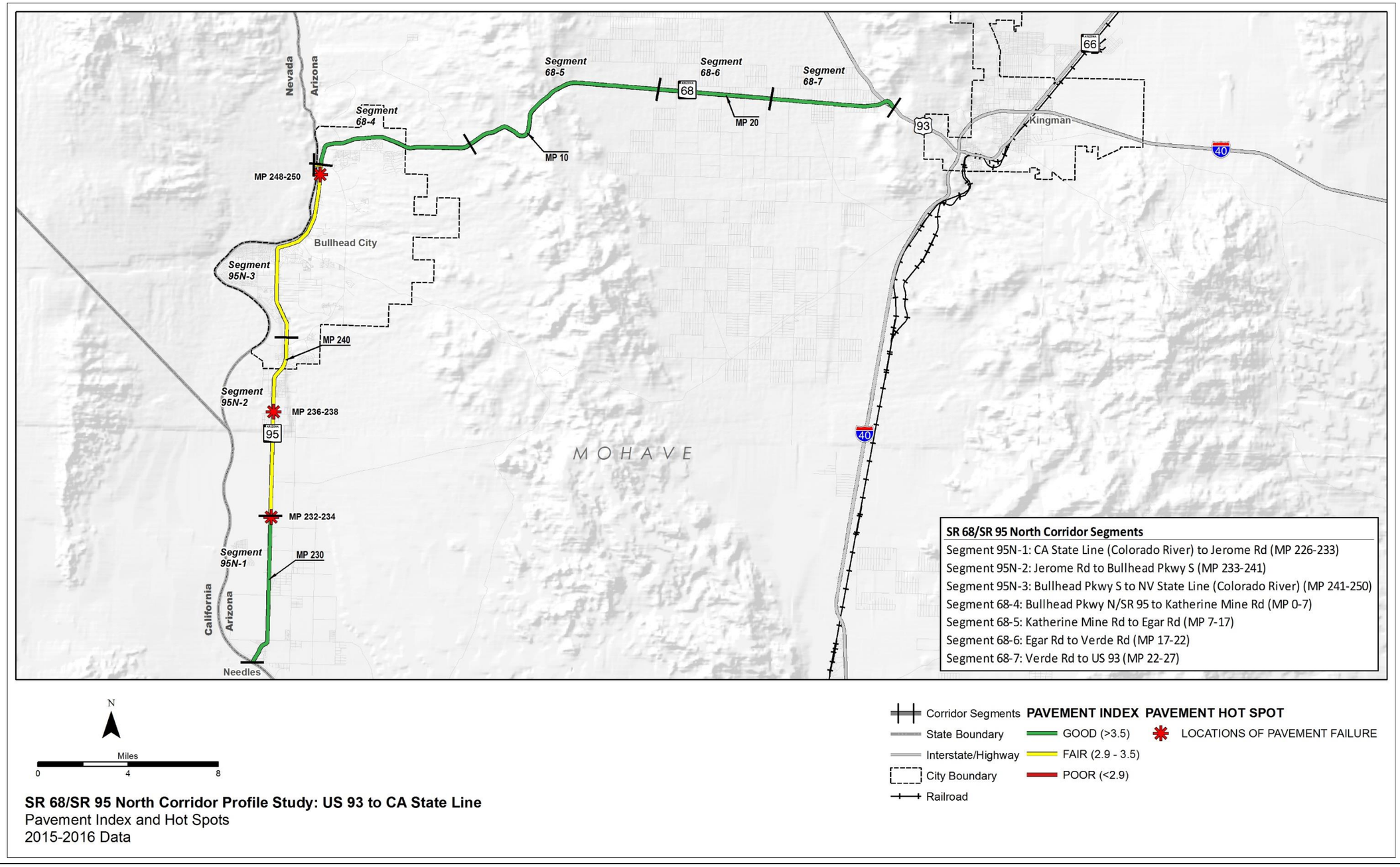
Table 5 summarizes the Pavement performance results for the SR 68/SR 95 North corridor. **Figure 8** illustrates the primary Pavement Index performance and locations of Pavement hot spots along the SR 68/SR 95 North corridor. Maps for each secondary measure can be found in **Appendix A**.

Table 5: Pavement Performance

Segment #	Segment Length (miles)	Pavement Index	Directional PSR		% Area Failure
			NB/EB	SB/WB	
95N-1	7	3.55	3.33		15.4%
95N-2	8	3.22	3.03		37.5%
95N-3	9	3.45	3.23		22.2%
68-4	7	3.95	3.78	3.75	0.0%
68-5	10	3.73	3.61	3.45	0.0%
68-6	5	3.62	3.35	3.26	0.0%
68-7	5	3.83	3.51		0.0%
Weighted Corridor Average		3.61	3.40	3.36	11.9%

SCALES		
Performance Level	**Non-Interstate**	
Good	> 3.50	< 5%
Fair	2.90 - 3.50	5% - 20%
Poor	< 2.90	> 20%

Figure 8: Pavement Performance

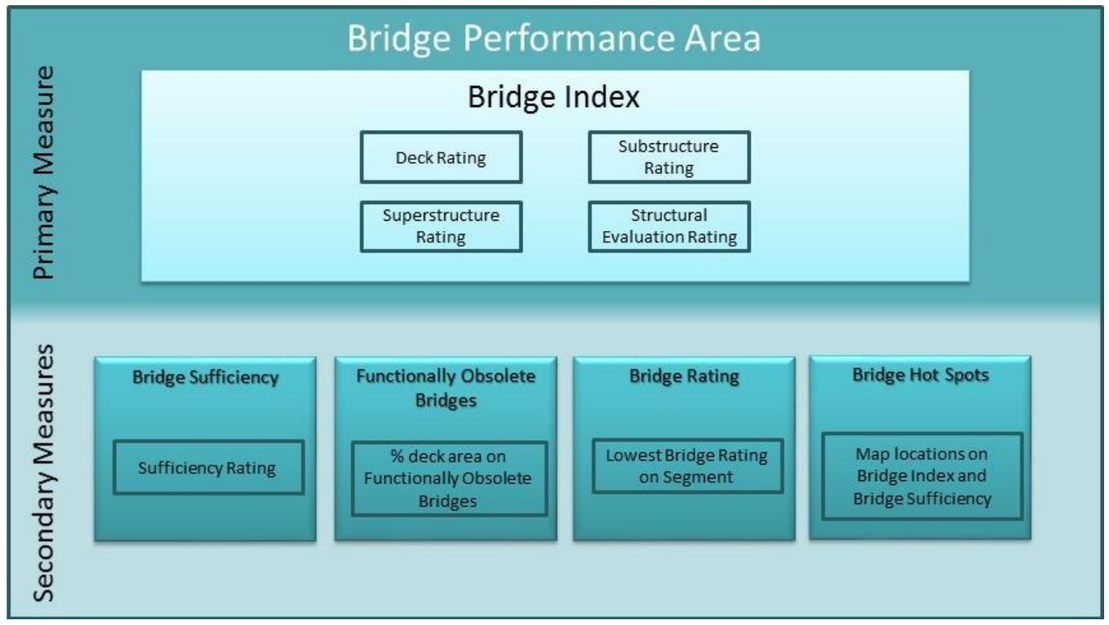


SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Pavement Index and Hot Spots
2015-2016 Data

2.3 Bridge Performance Area

The Bridge performance area consists of a primary measure (Bridge Index) and four secondary measures, as shown in **Figure 9**. These measures assess the condition of the existing bridges along the SR 68/SR 95 North corridor. Only bridges that carry mainline traffic or bridges that cross the mainline are included in the calculation. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C**.

Figure 9: Bridge Performance Measures



Primary Bridge Index

The Bridge Index is calculated based on the use of four different bridge condition ratings from the ADOT Bridge Database, also known as the Arizona Bridge Information and Storage System (ABISS). The four ratings are the Deck Rating, Substructure Rating, Superstructure Rating, and Structural Evaluation Rating. These ratings are based on inspection reports and establish the structural adequacy of each bridge. The performance of each individual bridge is established by using the lowest of these four ratings. The use of these ratings, and the use of the lowest rating, is consistent with the approach used by the ADOT Bridge Group to assess the need for bridge rehabilitation. The Bridge Index is calculated as a weighted average for each segment based on deck area.

Secondary Bridge Measures

Four secondary measures provide an in-depth evaluation of the characteristics of each bridge:

Bridge Sufficiency

- Multipart rating includes structural adequacy and safety factors as well as functional aspects such as traffic volume and length of detour
- Rates the structural and functional sufficiency of each bridge on a 100-point scale

Functionally Obsolete Bridges

- Percentage of total deck area in a segment that is on functionally obsolete bridges
- Identifies bridges that no longer meet standards for current traffic volumes, lane width, shoulder width, or bridge rails
- A bridge that is functionally obsolete may still be structurally sound

Bridge Rating

- The lowest rating of the four bridge condition ratings (substructure, superstructure, deck, and structural evaluation) on each segment
- Identifies lowest performing evaluation factor on each bridge

Bridge Hot Spots

- A Bridge “hot spot” is identified where a given bridge has a bridge rating of 4 or lower or multiple ratings of 5 between the deck, superstructure, and substructure ratings
- Identifies particularly low-performing bridges or those that may decline to low performance in the immediate future

Bridge Performance Results

The Bridge Index provides a high-level assessment of the structural condition of bridges for the corridor and for each segment. The four secondary measures provide more detailed information to assess bridge performance.

Based on the results of this analysis, the following observations were made:

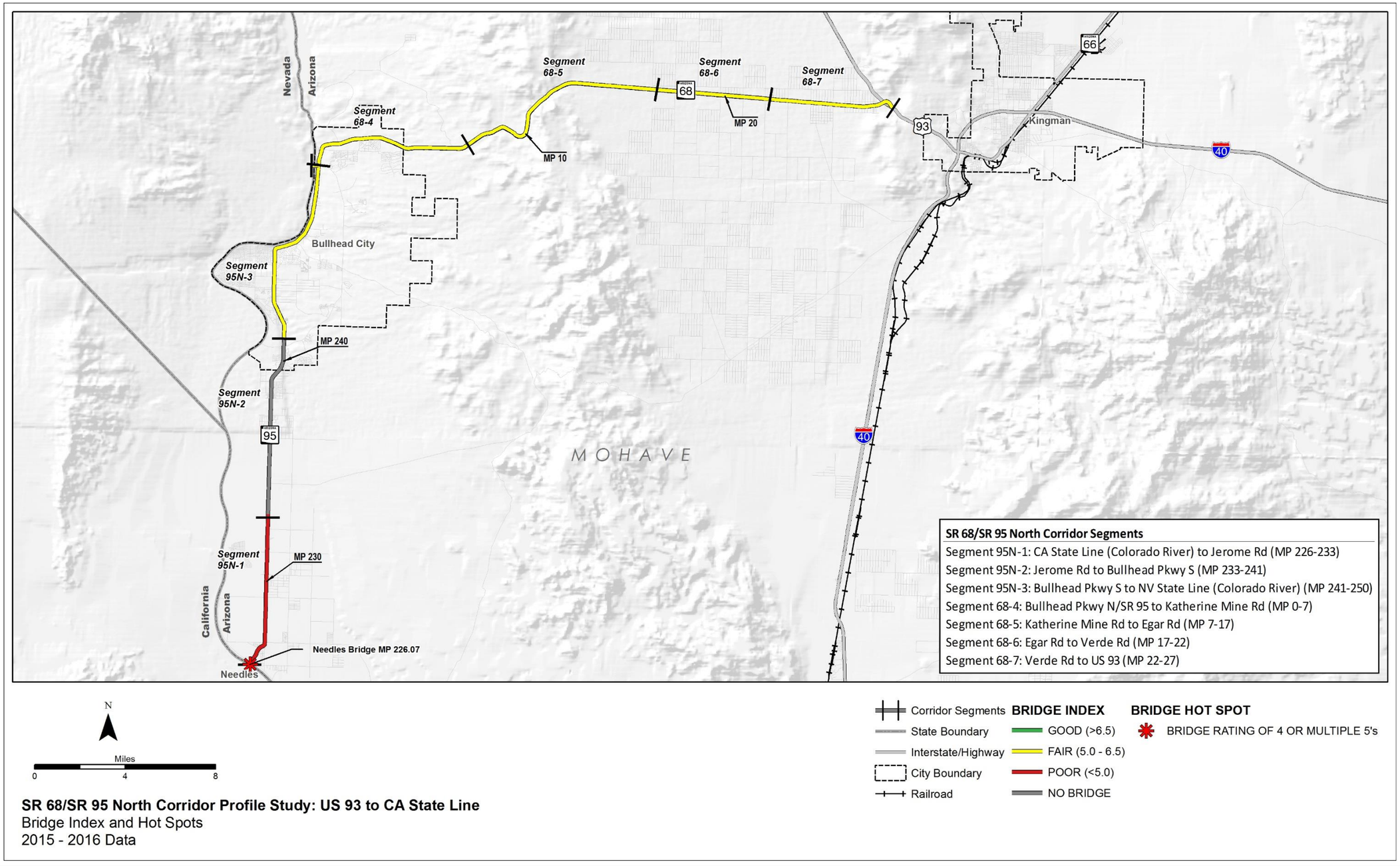
- The weighted average of the Bridge Index shows “fair” overall performance for the SR 68/SR 95 North corridor
- Segment 95N-2 contains no bridges
- The Bridge Index and Lowest Bridge Rating both show “poor” ratings for Segment 95N-1, which only includes one bridge: Needles Bridge over the Colorado River. This bridge is considered structurally deficient due to a deck rating of 4
- The Sufficiency Rating and % of Deck Area on Functionally Obsolete Bridges show “poor” ratings for Segment 95N-3, which only includes one bridge: Laughlin Bridge over the Colorado River. This bridge is considered functionally obsolete due to narrow shoulders and absence of a center median.
- The Needles Bridge (#2435, MP 266.07) in Segment 95N-1 is a hot spot

Table 6 summarizes the Bridge performance results for the SR 68/SR 95 North corridor. **Figure 10** illustrates the primary Bridge Index performance and locations of Bridge hot spots along the SR 68/SR 95 North corridor. Maps for each secondary measure can be found in **Appendix A**.

Table 6: Bridge Performance

Segment #	Segment Length (miles)	# of Bridges	Bridge Index	Sufficiency Rating	% of Deck Area on Functionally Obsolete Bridges	Lowest Bridge Rating
95N-1	7	1	4.00	80.90	0.0%	4
95N-2	8	0	No Bridges			
95N-3	9	1	5.00	49.80	100.0%	5
68-4	7	1	6.00	87.50	0.0%	6
68-5	10	5	6.38	94.63	0.0%	6
68-6	5	6	6.32	99.60	0.0%	6
68-7	5	1	6.00	98.20	0.0%	6
Weighted Corridor Average			6.05	92.48	6.67%	5.8
SCALES						
Performance Level			**All**			
Good			> 6.5	> 80	< 12%	> 6
Fair			5.0 - 6.5	50 - 80	12% - 40%	5 - 6
Poor			< 5.0	< 50	> 40 %	< 5

Figure 10: Bridge Performance

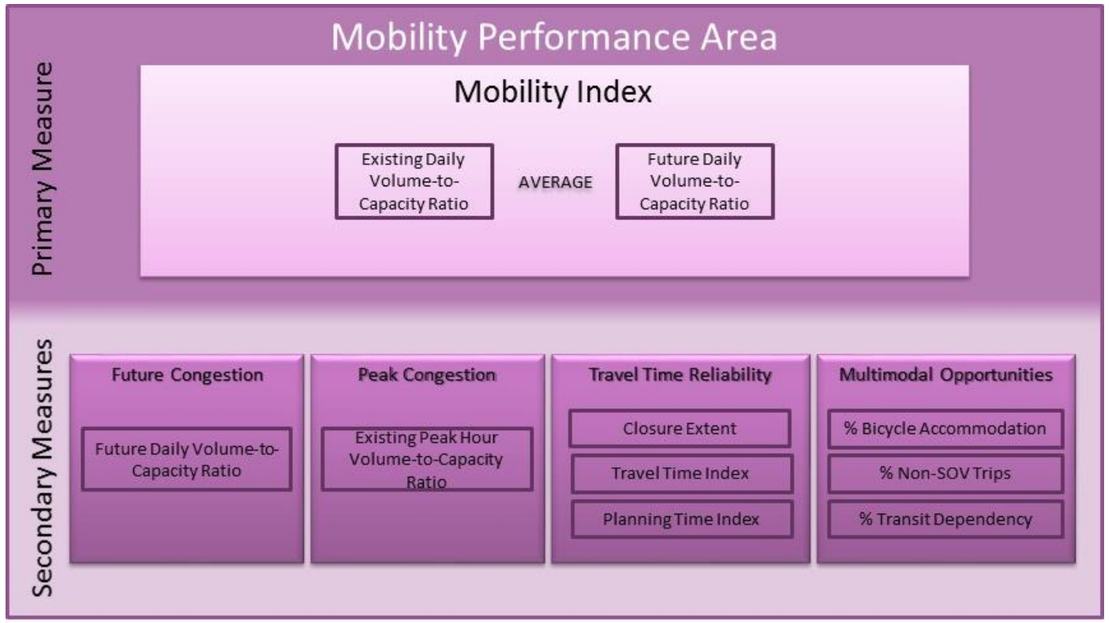


SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Bridge Index and Hot Spots
2015 - 2016 Data

2.4 Mobility Performance Area

The Mobility performance area consists of a primary measure (Mobility Index) and four secondary measures, as shown in **Figure 11**. These measures assess the condition of existing mobility along the SR 68/SR 95 North corridor. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C**.

Figure 11: Mobility Performance Measures



Primary Mobility Index

The Mobility Index is an average of the existing (2015) daily volume-to-capacity (V/C) ratio and the future (2035 AZTDM) daily V/C ratio for each segment of the corridor. The V/C ratio is an indicator of the level of congestion. This measure compares the average annual daily traffic (AADT) volume to the capacity of the corridor segment as defined by the service volume for level of service (LOS) E. By using the average of the existing and future year daily volumes, this index measures the level of daily congestion projected to occur in approximately ten years (2025) if no capacity improvements are made to the corridor.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the Mobility performance area, the relevant operating environments are urban vs. rural setting and interrupted flow (e.g., signalized at-grade intersections are present) vs. uninterrupted flow (e.g., controlled access grade-separated conditions such as a freeway or interstate highway). For the SR 68/SR 95 North corridor, the following operating environments were identified:

- Fringe Urban Interrupted Flow: Segments 95N-2 and 95N-3
- Fringe Urban Uninterrupted Flow: Segments 68-6 and 68-7
- Rural Interrupted Flow: Segments 95N-1 and 68-4
- Rural Uninterrupted Flow: Segment 68-5

Secondary Mobility Measures

Four secondary measures provide an in-depth evaluation of operational characteristics of the corridor:

Future Congestion – Future Daily V/C

- The future (2035 AZTDM) daily V/C ratio; this measure is the same value used in the calculation of the Mobility Index
- Provides a measure of future congestion if no capacity improvements are made to the corridor

Peak Congestion – Existing Peak Hour V/C

- The peak hour V/C ratio for each direction of travel
- Provides a measure of existing peak hour congestion during typical weekdays

Travel Time Reliability– Three separate travel time reliability indicators together provide a comprehensive picture of how much time may be required to travel within the corridor:

- Closure Extent:
  - The average number of instances a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel; a weighted average was applied to each closure that takes into account the distance over which the closure occurs
  - Closures related to crashes, weather, or other incidents are a significant contributor to non-recurring delays; construction-related closures were excluded from the analysis
- Directional Travel Time Index (TTI):
  - The ratio of the average peak period travel time to the free-flow travel time (based on the posted speed limit) in a given direction
  - The TTI recognizes the delay potential from recurring congestion during peak periods; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics
- Directional Planning Time Index (PTI):
  - The ratio of the 95th percentile travel time to the free-flow travel time (based on the posted speed limit) in a given direction

  - The PTI recognizes the delay potential from non-recurring delays such as traffic crashes, weather, or other incidents; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics
  - The PTI indicates the amount of time in addition to the typical travel time that should be allocated to make an on-time trip 95% of the time in a given direction

Multimodal Opportunities – Three multimodal opportunity indicators reflect the characteristics of the corridor that promote alternate modes to the single occupancy vehicle (SOV) for trips along the corridor:

- % Bicycle Accommodation:
  - Percentage of the segment that accommodates bicycle travel; bicycle accommodation on the roadway or on shoulders varies depending on traffic volumes, speed limits, and surface type
  - Encouraging bicycle travel has the potential to reduce automobile travel, especially on non-interstate highways
- % Non-SOV Trips:
  - The percentage of trips (less than 50 miles in length) by non-SOVs
  - The percentage of non-SOV trips in a corridor gives an indication of travel patterns along a section of roadway that could benefit from additional multimodal options
- % Transit Dependency:
  - The percentage of households that have zero or one automobile and households where the total income level is below the federally defined poverty level
  - Used to track the level of need among those who are considered transit dependent and more likely to utilize transit if it is available

Mobility Performance Results

The Mobility Index provides a high-level assessment of mobility conditions for the corridor and for each segment. The four secondary measures provide more detailed information to assess mobility performance.

Based on the results of this analysis, the following observations were made:

- The weighted average of the Mobility Index shows “good” overall performance for the SR 68/SR 95 North corridor, with Segment 95N-3 indicating “poor” performance and Segments 95N-1 and 95N-2 indicating “fair” performance
- The existing peak hour traffic operations show “good” performance for all segments in both directions of travel
- Segments 95N-1, 95N-2, and 95N-3 are anticipated to have “poor” traffic operations performance in the future according to the Future Daily V/C performance indicator
- The weighted average for the Closure Extent performance indicator for both NB/EB and SB/WB travel indicates “fair” performance
- The TTI performance indicator shows that all segments have “fair” or “good” performance levels
- The PTI performance indicator shows many of the SR 68/SR 95 North segments, both NB/EB and SB/WB, have “fair” or “poor” performance in terms of reliability
- Segments 95N-1, 95N-2, and 95N-3 shows “poor” performance in % Bicycle Accommodation
- The weighted average for % Non-SOV Trips shows “good” performance for the SR 68/SR 95 North corridor

Table 7 summarizes the Mobility performance results for the SR 68/SR 95 North corridor. **Figure 12** illustrates the primary Mobility Index performance along the SR 68/SR 95 North corridor. Maps for each secondary measure can be found in **Appendix A**.

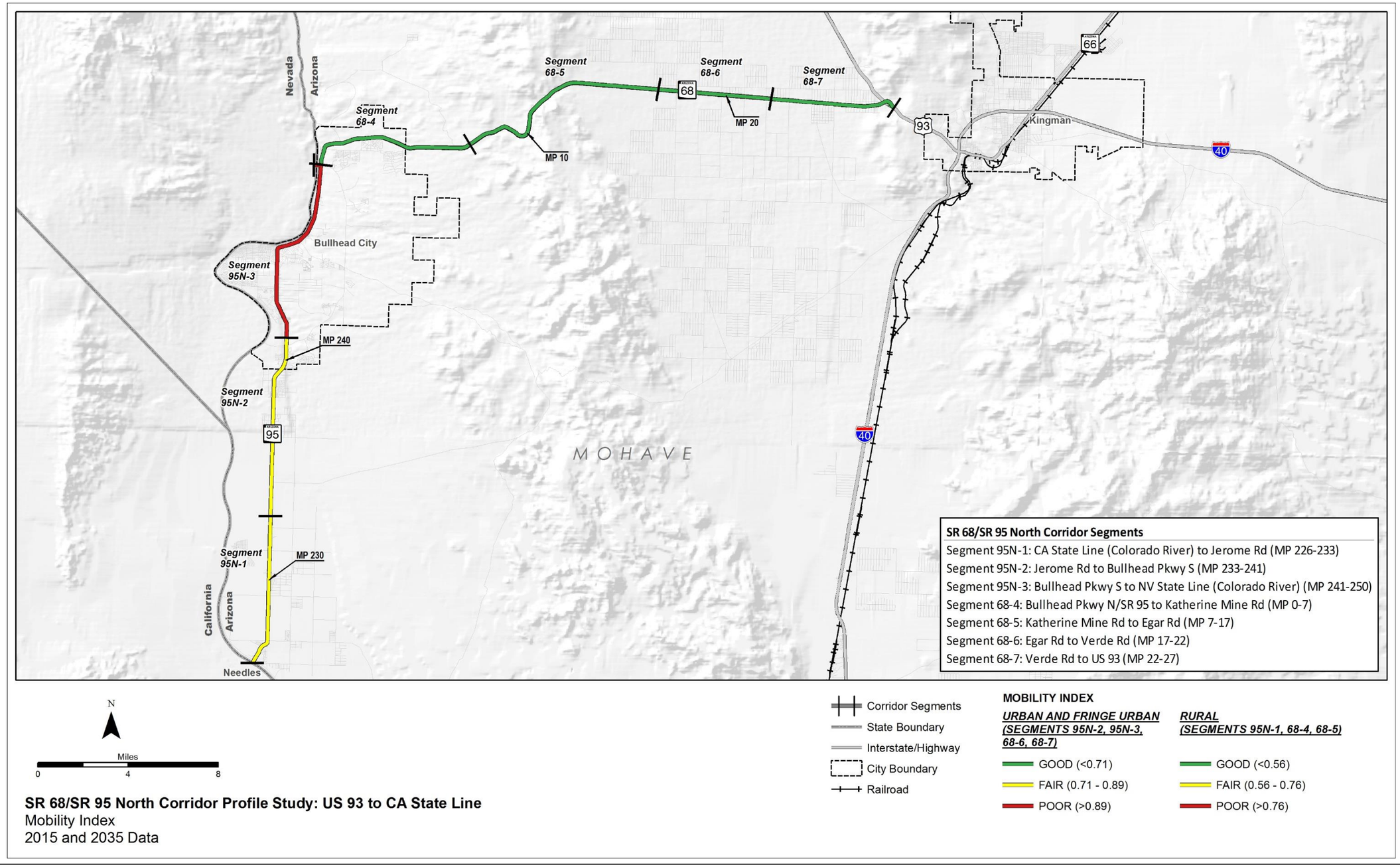
Table 7: Mobility Performance

Segment #	Segment Length (miles)	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent (instances/milepost/year/mile)		Directional TTI (all vehicles)		Directional PTI (all vehicles)		% Bicycle Accommodation	% Non-Single Occupancy Vehicle (SOV) Trips
				NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB		
95N-1[2]*	7	0.65	0.86	0.44	0.45	0.37	0.00	1.04	1.01	1.89	1.54	22%	15.9%
95N-2[1]*	8	0.89	1.09	0.67	0.68	0.13	1.38	1.22	1.19	3.43	3.22	1%	18.8%
95N-3[1]*	9	1.32	1.84	0.68	0.66	0.64	0.07	1.46	1.44	8.27	5.63	0%	21.3%
68-4[2]*	7	0.40	0.50	0.26	0.26	0.23	0.20	1.05	1.11	1.94	3.28	74%	18.5%
68-5[2]^	10	0.20	0.22	0.17	0.17	0.26	0.16	1.06	1.03	1.71	1.39	100%	18.1%
68-6[1]^	5	0.14	0.15	0.12	0.12	0.36	0.04	1.01	1.01	1.34	1.27	98%	16.1%
68-7[1]^	5	0.18	0.22	0.15	0.11	0.52	0.36	1.00	1.00	1.29	1.21	98%	9.7%
Weighted Corridor Average		0.59	0.76	0.38	0.38	0.35	0.33	1.14	1.13	3.11	2.67	52%	17.5%

SCALES						
Performance Level	**Urban Rural**	**All**	**Uninterrupted Interrupted**		**All**	
Good	< 0.71[1] < 0.56[2]	< 0.22	< 1.15^ < 1.30*	< 1.30^ < 3.00*	> 90%	> 17%
Fair	0.71 - 0.89[1] 0.56 - 0.76[2]	0.22 – 0.62	1.15 - 1.33^ 1.30 - 2.00*	1.30 - 1.50^ 3.00 - 6.00*	60% - 90%	11% - 17%
Poor	> 0.89[1] > 0.76[2]	> 0.62	> 1.33^ > 2.00*	> 1.50^ > 6.00*	< 60%	< 11%

[1]Urban Operating Environment
[2]Rural Operating Environment
^Uninterrupted Flow Facility
*Interrupted Flow Facility

Figure 12: Mobility Performance

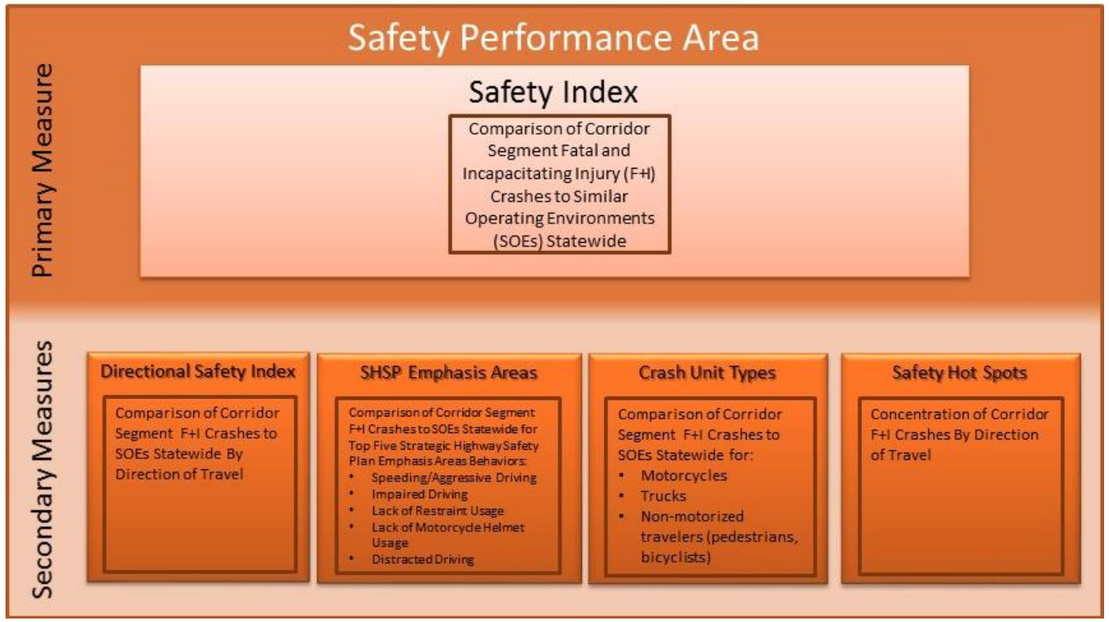


SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Mobility Index
2015 and 2035 Data

2.5 Safety Performance Area

The Safety performance area consists of a primary measure (Safety Index) and four secondary measures, as illustrated in **Figure 13**. All measures relate to crashes that result in fatal and incapacitating injuries, as these types of crashes are the emphasis of the ADOT Strategic Highway Safety Plan (SHSP), FHWA, and MAP-21. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 13: Safety Performance Measures



Primary Safety Index

The Safety Index is based on the bi-directional frequency and rate of fatal and incapacitating injury crashes, the relative cost of those types of crashes, and crash occurrences on similar roadways in Arizona. According to ADOT's 2010 Highway Safety Improvement Program Manual, fatal crashes have an estimated cost that is 14.5 times the estimated cost of incapacitating injury crashes ($5.8 million compared to $400,000).

Each corridor segment is rated on a scale by comparing the segment score with the average statewide score for similar operating environments. Because crash frequencies and rates vary depending on the operating environment of a particular roadway, statewide values were developed for similar operating environments defined by functional classification, urban vs. rural setting, number of travel lanes, and traffic volumes. For the SR 68/SR 95 North corridor, the following operating environments were identified:

- 2 or 3 or 4 Lane Divided Highway: Segments 68-4, 68-5, 68-6
- 4 or 5 Lane Undivided Highway: Segments 95N-1, 95N-2, 95N-3, and 68-7

Secondary Safety Measures

Four secondary measures provide an in-depth evaluation of the different characteristics of safety performance:

Directional Safety Index

- This measure is based on the directional frequency and rate of fatal and incapacitating injury crashes

SHSP Emphasis Areas

ADOT's 2014 SHSP identified several emphasis areas for reducing fatal and incapacitating injury crashes. This measure compared rates of crashes in the top five SHSP emphasis areas to other corridors with a similar operating environment. The top five SHSP emphasis areas related to the following driver behaviors:

- Speeding and aggressive driving
- Impaired driving
- Lack of restraint usage
- Lack of motorcycle helmet usage
- Distracted driving

Crash Unit Types

- The percentage of total fatal and incapacitating injury crashes that involves crash unit types of motorcycles, trucks, or non-motorized travelers is compared to the statewide average on roads with similar operating environments

Safety Hot Spots

- The hot spot analysis identifies abnormally high concentrations of fatal and incapacitating injury crashes along the study corridor by direction of travel

For the Safety Index and the secondary safety measures, any segment that has too small of a sample size to generate statistically reliable performance ratings for a particular performance measure is considered to have "insufficient data" and is excluded from the safety performance evaluation for that particular performance measure.

Safety Performance Results

The Safety Index provides a high-level assessment of safety performance for the corridor and for each segment. The four secondary measures provide more detailed information to assess safety performance.

Based on the results of this analysis, the following observations were made:

- The crash unit type performance measures for crashes involving trucks had insufficient data to generate reliable performance ratings for the SR 68/SR 95 North corridor
- Segments 95N-1 and 68-7 had insufficient data to generate reliable performance ratings for crashes involving motorcycles
- Segment 68-5 had insufficient data to generate reliable performance ratings for crashes involving non-motorized travelers
- A total of 153 fatal and incapacitating injury crashes occurred along the SR 68/SR 95 North corridor in 2011-2015; of these crashes, 39 were fatal and 114 involved incapacitating injuries
- The weighted average of the Safety Index shows “below average” performance for the SR 68/SR 95 North corridor compared to other segments statewide that have similar operating environments, meaning the corridor generally does not perform well as it relates to safety
- The Safety Index value for Segments 95N-2, 95N-3, 68-5, 68-6, and 68-7 is “below average”, meaning these segments have more crashes than is typical statewide
- The Directional Safety Index value for a majority of the segments along the corridor and the corridor weighted average is “below average” compared to similar operating environments statewide
- The percentage of fatal and incapacitating crashes related to the SHSP Top 5 Emphasis Areas is higher in Segments 68-4 than the statewide average for similar operating environments
- The percentage of fatal and incapacitating crashes involving motorcycles is higher in Segment 68-5 than the statewide average for similar operating environments
- The percentage of fatal and incapacitating crashes involving non-motorized travelers is higher in each segment of the corridor, excluding Segments 95N-2 and 68-5, than the statewide average for similar operating environments
- Safety hot spots include:
    - SR 95 North MP 226-227
    - SR 95 North MP 234-250
    - SR 68 North MP 8-11
    - SR 68 North MP 17-20
    - SR 68 North MP 21-27

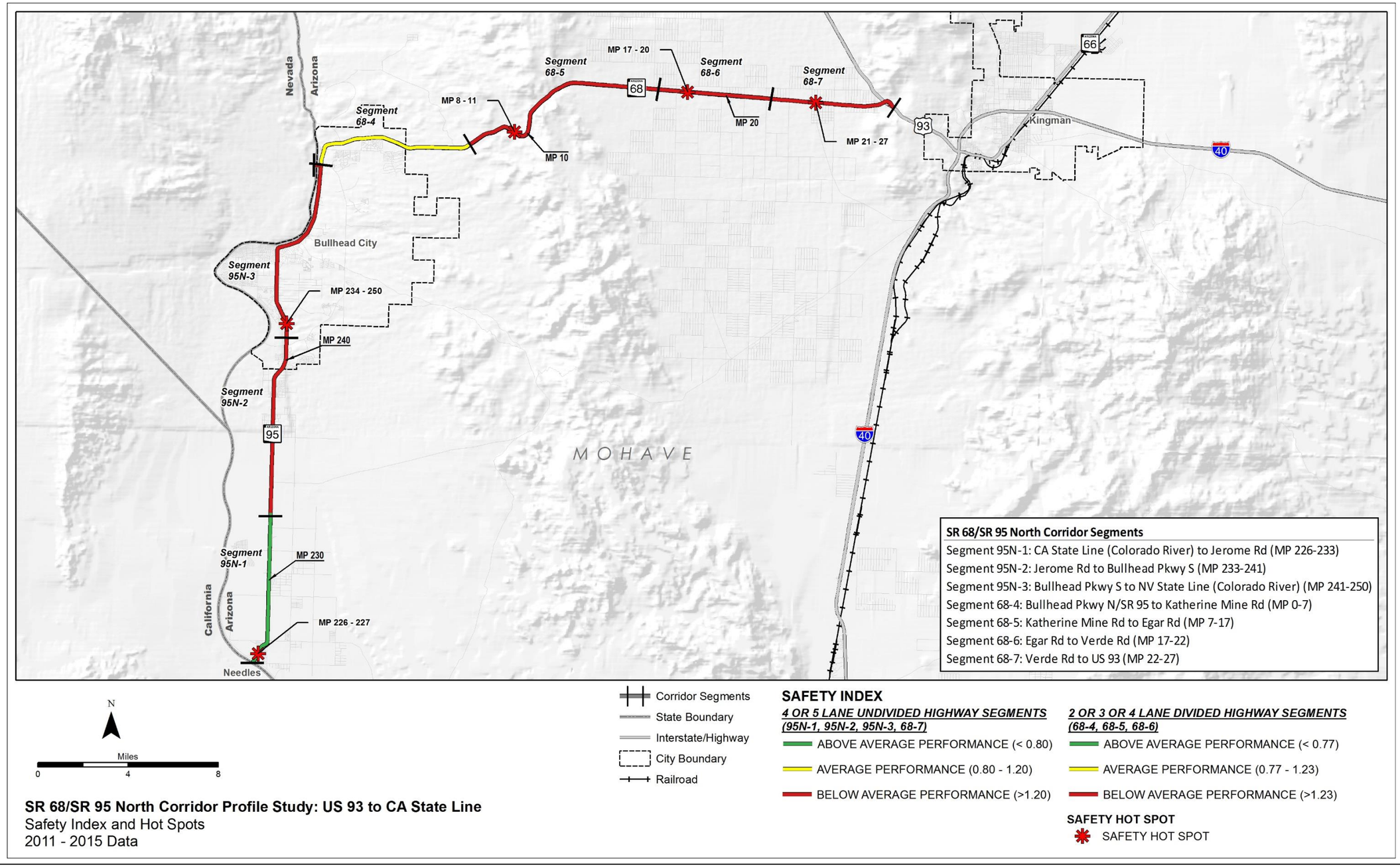
Table 8 summarizes the Safety performance results for the SR 68/SR 95 North corridor. **Figure 14** illustrates the primary Safety Index performance and locations of Safety hot spots along the SR 68/SR 95 North corridor. Maps for each secondary measure can be found in **Appendix A**.

Table 8: Safety Performance

Segment #	Segment Length (miles)	Total Fatal & Incapacitating Injury Crashes (F/I)	Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors	% of Fatal + Incapacitating Injury Crashes Involving Trucks	% of Fatal + Incapacitating Injury Crashes Involving Motorcycles	% of Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers
				NB/EB	SB/WB				
95N-1[b]	7	1/9	0.58	0.10	1.05	40%	Insufficient Data	Insufficient Data	20%
95N-2[b]	8	7/50	2.38	3.10	1.66	46%	Insufficient Data	7%	7%
95N-3[b]	9	10/28	2.22	0.73	3.72	34%	Insufficient Data	5%	11%
68-4[a]	7	2/4	1.11	1.25	0.97	100%	Insufficient Data	0%	33%
68-5[a]	10	7/6	2.78	1.82	3.75	46%	Insufficient Data	69%	Insufficient Data
68-6[a]	5	4/8	3.07	4.34	1.80	25%	Insufficient Data	8%	17%
68-7[b]	5	8/9	4.12	4.16	4.08	29%	Insufficient Data	Insufficient Data	18%
Weighted Corridor Average			2.25	2.00	2.51	47%	Insufficient Data	21%	17%
SCALES									
Performance Level			**2 or 3 or 4 Lane Divided Highway**						
Above Average			< 0.77			< 44%	< 4%	< 16%	< 2%
Average			0.77 – 1.23			44% - 54%	4% - 7%	16% - 26%	2% - 4%
Below Average			> 1.23			> 54%	> 7%	> 26%	> 4%
Performance Level			**4 or 5 Lane Undivided Highway**						
Above Average			< 0.80			< 42%	< 6%	< 6%	< 5%
Average			0.80 – 1.20			42% - 51%	6% - 10%	6% - 9%	5% - 8%
Below Average			> 1.20			> 51%	> 10%	> 9%	> 8%

[a]2 or 3 or 4 Lane Divided Highway
[b]4 or 5 Lane Undivided Highway
Note: "Insufficient Data" indicates there was not enough data available to generate reliable performance ratings.

Figure 14: Safety Performance



SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Safety Index and Hot Spots
2011 - 2015 Data

2.6 Freight Performance Area

The Freight performance area consists of a single primary measure (Freight Index) and five secondary measures, as illustrated in **Figure 15**. All measures related to the reliability of truck travel as measured by observed truck travel time speed and delays to truck travel from freeway closures or physical restrictions to truck travel. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C**.

Figure 15: Freight Performance Measures

Primary Freight Index

The Freight Index is a reliability performance measure based on the PTI for truck travel. The Truck Planning Time Index (TPTI) is the ratio of the 95th percentile truck travel time to the free-flow truck travel time. The TPTI reflects the extra buffer time needed for on-time delivery while accounting for non-recurring delay. Non-recurring delay refers to unexpected or abnormal delay due to closures or restrictions resulting from circumstances such as crashes, inclement weather, and construction activities.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the Freight performance area, the relevant operating environments are interrupted flow (e.g., signalized at-grade intersections are present) and uninterrupted flow (e.g., controlled access grade-separated conditions such as a freeway or interstate highway).

For the SR 68/SR 95 North corridor, the following operating environments were identified:

- Interrupted Flow: Segments 95N-1, 95N-2, 95N-3, and 68-4
- Uninterrupted Flow: Segments 68-5, 68-6, and 68-7

Secondary Freight Measures

The Freight performance area includes five secondary measures that provide an in-depth evaluation of the different characteristics of freight performance:

Recurring Delay (Directional Truck Travel Time Index [TTTI])

- The ratio of the average peak period truck travel time to the free-flow truck travel time (based on the posted speed limit up to a maximum of 65 miles per hour) in a given direction
- The TTTI recognizes the delay potential from recurring congestion during peak periods; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics

Non-Recurring Delay (Directional TPTI)

- The ratio of the 95th percentile truck travel time to the free-flow truck travel time (based on the posted speed limit up to a maximum of 65 miles per hour) in a given direction
- The TPTI recognizes the delay potential from non-recurring delays such as traffic crashes, weather, or other incidents; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics
- The TPTI indicates the amount of time in addition to the typical travel time that should be allocated to make an on-time trip 95% of the time in a given direction

Closure Duration

- The average time (in minutes) a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel; a weighted average is applied to each closure that takes into account the distance over which the closure occurs

Bridge Vertical Clearance

- The minimum vertical clearance (in feet) over the travel lanes for underpass structures on each segment

Bridge Vertical Clearance Hot Spots

- A Bridge vertical clearance “hot spot” exists where the underpass vertical clearance over the mainline travel lanes is less than 16.25 feet and no exit/entrance ramps exist to allow vehicles to bypass the low clearance location
- If a location with a vertical clearance less than 16.25 feet can be avoided by using immediately adjacent exit/entrance ramps rather than the mainline, it is not considered a hot spot

Freight Performance Results

The Freight Index provides a high-level assessment of freight mobility for the corridor and for each segment. The five secondary measures provide more detailed information to assess freight performance.

Based on the results of this analysis, the following observations were made:

- The weighted average of the Freight Index shows "fair" overall performance for the SR 68/SR 95 North corridor, with Segments 95N-3, 68-5, and 68-6 showing "poor" performance
- All of the segments show either "good" or "fair" performance for the Directional TTTI measures
- A majority of the segments show either "poor" or "fair" performance for Directional TPTI measures, meaning the corridor has "poor" or "fair" travel time reliability in the NB/EB and SB/WB direction due to non-recurring congestion
- Segment 68-6 in the NB/EB direction and Segment 95N-2 in the SB/WB direction show "poor" performance in the closure duration performance measure; all other segments show "good" or "fair" performance
- No bridge vertical clearance hot spots exist along the SR 68/SR 95 North corridor

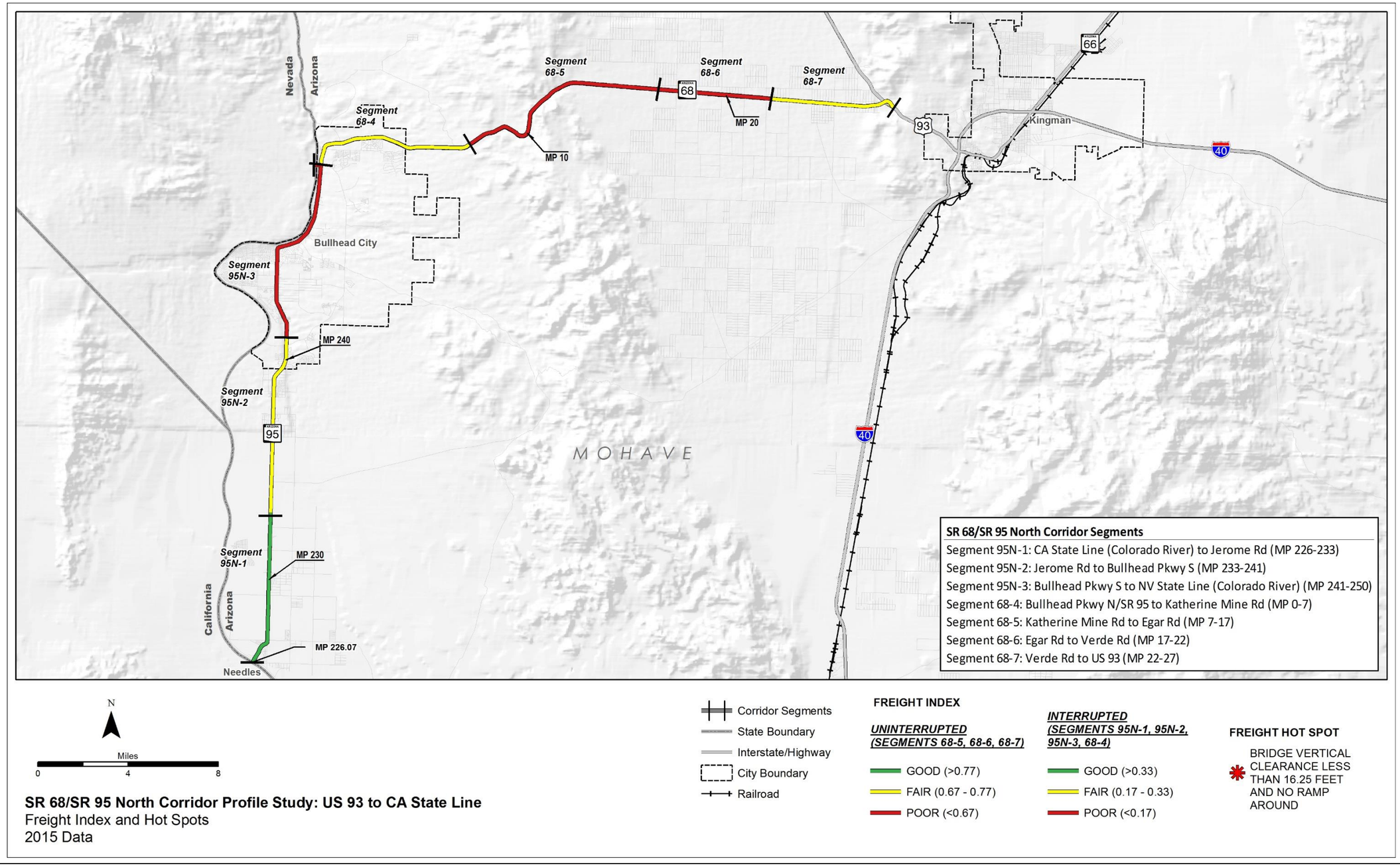
Table 9 summarizes the Freight performance results for the SR 68/SR 95 North corridor. **Figure 16** illustrates the primary Freight Index performance and locations of freight hot spots along the SR 68/SR 95 North corridor. Maps for each secondary measure can be found in **Appendix A**.

Table 9: Freight Performance

Segment #	Segment Length (miles)	Freight Index	Directional TTTI		Directional TPTI		Closure Duration (minutes/ milepost/ year/mile)		Bridge Vertical Clearance (feet)
			NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	
95N-1[2]*	7	0.53	1.08	1.05	2.16	1.61	42.31	0.00	No UP
95N-2[1]*	8	0.24	1.30	1.27	4.31	3.93	15.85	226.25	No UP
95N-3[1]*	9	0.14	1.56	1.61	7.00	7.32	55.89	4.53	No UP
68-4[2]*	7	0.27	1.26	1.24	2.20	5.11	34.11	34.00	No UP
68-5[2]^	10	0.45	1.27	1.01	2.05	2.44	44.42	35.24	No UP
68-6[1]^	5	0.63	1.05	1.00	1.46	1.71	128.68	3.56	No UP
68-7[1]^	5	0.74	1.00	1.00	1.24	1.45	59.80	43.52	No UP
Weighted Corridor Average		0.40	1.25	1.19	3.17	3.62	50.06	52.55	No UP
SCALES									
Performance Level		**Uninterrupted Interrupted**					**All**		
Good		> 0.77^ > 0.33*		< 1.15^ < 1.30*		< 1.30^ < 3.00*	< 44.18		> 16.5
Fair		0.67 - 0.77^ 0.17 - 0.33*		1.15 -1.33^ 1.30 - 2.00*		1.30 - 1.50^ 3.00-6.00*	44.18 -124.86		16.0 - 16.5
Poor		< 0.67^ < 0.17*		> 1.33^ > 2.00*		> 1.50^ > 6.00*	> 124.86		< 16.0

[1]Urban Operating Environment
[2]Rural Operating Environment
^Uninterrupted Flow Facility
*Interrupted Flow Facility

Figure 16: Freight Performance



SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Freight Index and Hot Spots
2015 Data

2.7 Corridor Performance Summary

Based on the results presented in the preceding sections, the following general observations were made related to the performance of the SR 68/SR 95 North corridor:

- Overall Performance: The Pavement and Bridge performance areas show generally "good" or "fair" performance; the Safety performance area shows generally "below average" performance; the Mobility and Freight performance areas show a mix of "good", "fair", and "poor" performance
- Pavement Performance: The weighted average of the Pavement Index shows "good" overall performance for the SR 68/SR 95 North corridor; Segments 95N-1, 95N-2 and 95N-3 show "poor" or "fair" performance for all Pavement performance area measures
- Bridge Performance: The weighted average of the Bridge Index shows "fair" overall performance for the SR 68/SR 95 North corridor; Segment 95N-1 shows "poor" performance for the Bridge Index and the Lowest Bridge Rating measures; Segment 95N-3 shows "poor" performance for the Sufficiency Rating and % of Deck Area on Functionally Obsolete Bridges measures; Segment 95N-2 contains no bridges
- Mobility Performance: The weighted average of the Mobility Index shows "fair" overall performance for the SR 68/SR 95 North corridor; Segments 95N-1, 95N-2, and 95N-3 show "poor" or "fair" performance for the Mobility Index, Future Daily V/C, and % Bicycle Accommodation measures; Segment 95N-1 shows "poor" performance for the Existing Peak Hour V/C measure; all segments show "fair" or "poor" performance for the Closure Extent measure in at least one direction; Segments 95N-3 and 68-5 show "poor" performance for the Directional PTI measure in the NB/EB direction
- Safety Performance: The weighted average of the Safety Index shows "below average" overall performance for the SR 68/SR 95 North corridor; in the 2011-2015 analysis period, there were 39 fatal crashes and 114 incapacitating injury crashes; all segments except Segment 95N-1 show "below average" performance for the Safety Index in one or both directions; segments with "below average" performance on secondary safety performance measures are Segment 68-4 for crashes involving SHSP Top 5 Emphasis Areas, Segment 68-5 for crashes involving motorcycles, and Segments 95N-1, 95N-3, 68-4, 68-6, and 68-7 for crashes involving non-motorized travelers; there was "insufficient data" for crashes involving trucks, meaning there was not enough data available to generate reliable performance ratings so no values were calculated
- Freight Performance: The weighted average of the Freight Index shows "fair" overall performance for the SR 68/SR 95 North corridor; Segments 95N-3, 68-5, and 68-6 show "poor" performance for the Directional PTI measure in one or both directions; Segments 95N-2 and 68-6 show "poor" performance for the Closure Duration measure in one direction; there are no underpasses on the corridor so there are no vertical clearance restrictions
- Lowest Performing Segments: Segments 95N-2 and 95N-3 show "poor/below average" performance for many performance measures
- Highest Performing Segments: Segments 68-4 and 68-7 show "good/above average" performance for many performance measures

Figure 17 shows the percentage of the SR 68/SR 95 North corridor that rates either "good/above average" performance, "fair/average" performance, or "poor/below average" performance for each primary measure. On the SR 68/SR 95 North corridor, Safety is the lowest performing area with 73% of the corridor having "below average" performance as it relates to the primary measure. Pavement is the highest performing area on the SR 68/SR 95 North corridor with 53% of the corridor having "good" performance as it relates to the primary measure. The Bridge performance area generally has "fair" performance. The Mobility and Freight performance areas show a more even mix of "good", "fair" and "poor" performance.

Table 10 shows a summary of corridor performance for all primary measures and secondary measure indicators for the SR 68/SR 95 North corridor. A weighted corridor average rating (based on the length of the segment) was calculated for each primary and secondary measure. The weighted average ratings are summarized in **Figure 18** which also provides a brief description of each performance measure. **Figure 18** represents the average for the entire corridor and any given segment or location could have a higher or lower rating than the corridor average.

Figure 17: Performance Summary by Primary Measure

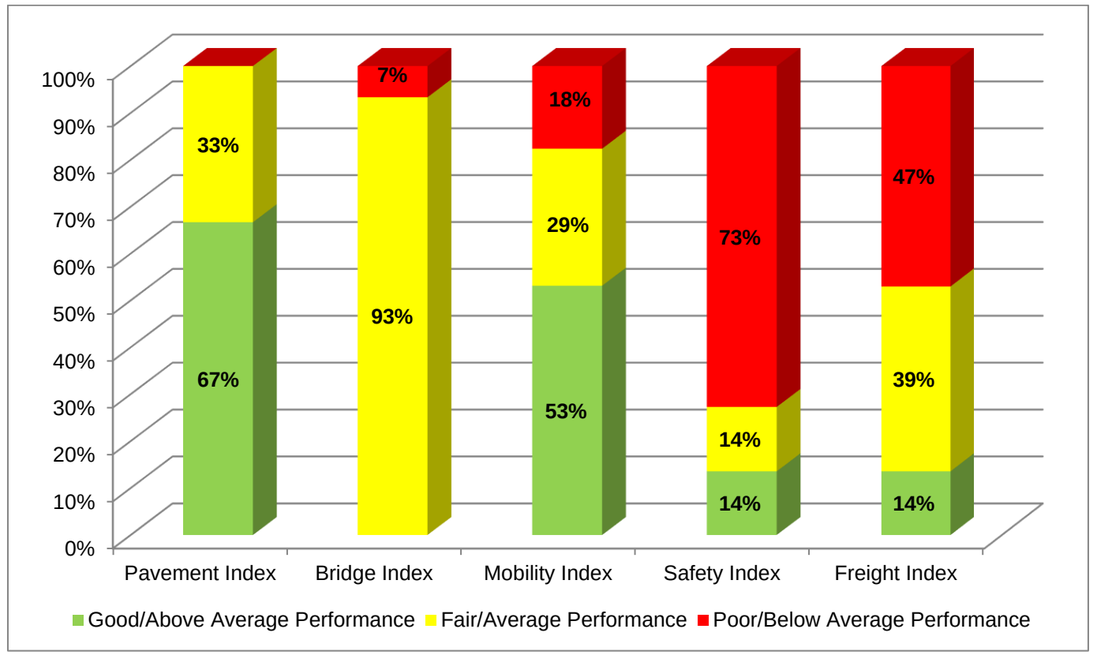


Figure 18: Corridor Performance Summary by Performance Measure

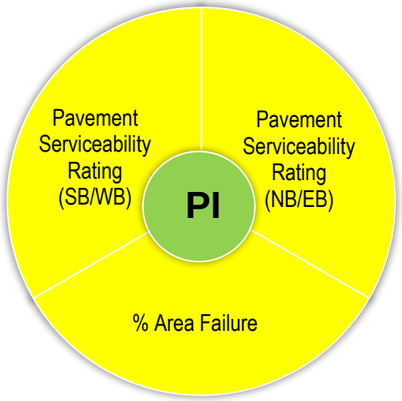
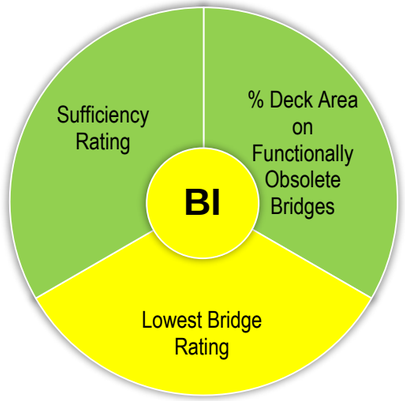
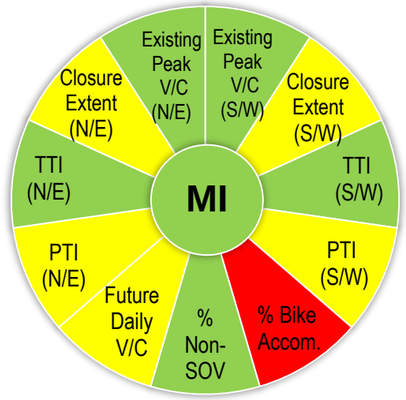
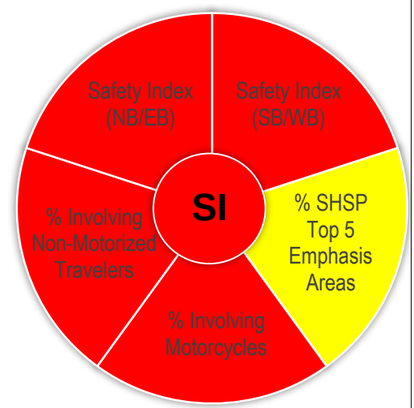
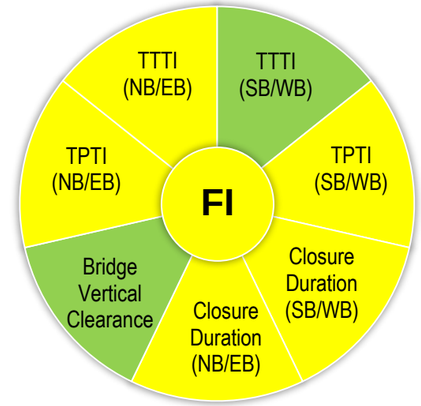
Pavement	Bridge	Mobility	Safety	Freight
				
Pavement Index (PI): based on two pavement condition ratings from the ADOT Pavement Database; the two ratings are the International Roughness Index (IRI) and the Cracking Rating	**Bridge Index (BI):** based on four bridge condition ratings from the ADOT Bridge Database; the four ratings are the Deck Rating, Substructure Rating, Superstructure Rating, and Structural Evaluation Rating	**Mobility Index (MI):** an average of the existing daily volume-to-capacity (V/C) ratio and the projected 2035 daily V/C ratio	**Safety Index (SI):** combines the bi-directional frequency and rate of fatal and incapacitating injury crashes, compared to crash occurrences on similar roadways in Arizona	**Freight Index (FI):** a reliability performance measure based on the bi-directional planning time index for truck travel
➢ **Directional Pavement Serviceability Rating (PSR)** – the weighted average (based on number of lanes) of the PSR for the pavement in each direction of travel ➢ **% Area Failure** – the percentage of pavement area rated above failure thresholds for IRI or Cracking	➢ **Sufficiency Rating**– multipart rating includes structural adequacy and safety factors as well as functional aspects such as traffic volume and length of detour ➢ **% of Deck Area on Functionally Obsolete Bridges**– the percentage of deck area in a segment that is on functionally obsolete bridges; identifies bridges that no longer meet standards for current traffic volumes, lane width, shoulder width, or bridge rails; a bridge that is functionally obsolete may still be structurally sound ➢ **Lowest Bridge Rating** –the lowest rating of the four bridge condition ratings on each segment	➢ **Future Daily V/C** – the future 2035 V/C ratio provides a measure of future congestion if no capacity improvements are made to the corridor ➢ **Existing Peak Hour V/C** – the existing peak hour V/C ratio for each direction of travel provides a measure of existing peak hour congestion during typical weekdays ➢ **Closure Extent** – the average number of instances a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel ➢ **Directional Travel Time Index (TTI)** – the ratio of the average peak period travel time to the free-flow travel time; the TTI represents recurring delay along the corridor ➢ **Directional Planning Time Index (PTI)** – the ratio of the 95th percentile travel time to the free-flow travel time; the PTI represents non-recurring delay along the corridor ➢ **% Bicycle Accommodation** – the percentage of a segment that accommodates bicycle travel ➢ **% Non-single Occupancy Vehicle (Non-SOV) Trips** –the percentage of trips that are taken by vehicles carrying more than one occupant	➢ **Directional Safety Index** – the combination of the directional frequency and rate of fatal and incapacitating injury crashes, compared to crash occurrences on similar roadways in Arizona ➢ **% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors** – the percentage of fatal and incapacitating crashes that involve at least one of the five Strategic Highway Safety Plan (SHSP) emphasis areas on a given segment compared to the statewide average percentage on roads with similar operating environments ➢ **% of Fatal + Incapacitating Crashes Involving SHSP Crash Unit Types** – the percentage of total fatal and incapacitating injury crashes that involves a given crash unit type (motorcycle, truck, non-motorized traveler) compared to the statewide average percentage on roads with similar operating environments	➢ **Directional Truck Travel Time Index (TTTI)** – the ratio of the average peak period truck travel time to the free-flow truck travel time; the TTTI represents recurring delay along the corridor ➢ **Directional Truck Planning Time Index (TPTI)** – the ratio the 95th percentile truck travel time to the free-flow truck travel time; the TPTI represents non-recurring delay along the corridor ➢ **Closure Duration** – the average time a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel ➢ **Bridge Vertical Clearance** – the minimum vertical clearance over the travel lanes for underpass structures on each segment

Table 10: Corridor Performance Summary by Segment and Performance Measure

Segment #	Segment Length (miles)	Pavement Performance Area				Bridge Performance Area				Mobility Performance Area											
		Pavement Index	Directional PSR		% Area Failure	Bridge Index	Sufficiency Rating	% of Deck Area on Functionally Obsolete Bridges	Lowest Bridge Rating	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent (instances/ milepost/ year/mile)		Directional TTI (all vehicles)		Directional PTI (all vehicles)		% Bicycle Accommodation	% Non-Single Occupancy Vehicle (SOV) Trips
			NB/EB	SB/WB								NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB		
95N-1*[b2]	7	3.55	3.33		15.4%	4.00	80.90	0.0%	4	0.65	0.86	0.44	0.45	0.37	0.00	1.04	1.01	1.89	1.54	22%	15.9%
95N-2*[b1]	8	3.22	3.03		37.5%	No Bridges				0.89	1.09	0.67	0.68	0.13	1.38	1.22	1.19	3.43	3.22	1%	18.8%
95N-3*[b1]	9	3.45	3.23		22.2%	5.00	49.80	100.0%	5	1.32	1.84	0.68	0.66	0.64	0.07	1.46	1.44	8.27	5.63	0%	21.3%
68-4*[a2]	7	3.95	3.78	3.75	0.0%	6.00	87.50	0.0%	6	0.40	0.50	0.26	0.26	0.23	0.20	1.05	1.11	1.94	3.28	74%	18.5%
68-5^[a2]	10	3.73	3.61	3.45	0.0%	6.38	94.63	0.0%	6	0.20	0.22	0.17	0.17	0.26	0.16	1.06	1.03	1.71	1.39	100%	18.1%
68-6^[a1]	5	3.62	3.35	3.30	0.0%	6.32	99.60	0.0%	6	0.14	0.15	0.12	0.12	0.36	0.04	1.01	1.01	1.34	1.27	98%	16.1%
68-7^[b1]	5	3.83	3.51		0.0%	6.00	98.20	0.0%	6	0.18	0.19	0.15	0.11	0.52	0.36	1.00	1.00	1.29	1.21	98%	9.7%
Weighted Corridor Average		3.61	3.40	3.36	11.9%	6.05	92.48	6.67%	5.8	0.59	0.76	0.38	0.38	0.35	0.33	1.14	1.13	3.11	2.67	52%	17.5%

SCALES

Performance Level	Non-Interstate			All				Urban and Fringe Urban	All	Uninterrupted		All	
Good/Above Average Performance	> 3.50	> 3.50	< 5%	> 6.5	> 80	< 12%	> 6	< 0.71	< 0.22	< 1.15	< 1.3	> 90%	> 17%
Fair/Average Performance	2.90 - 3.50	2.90 - 3.50	5% - 20%	5.0 - 6.5	50 - 80	12% - 40%	5 - 6	0.71 - 0.89	0.22 - 0.62	1.15 - 1.33	1.3 - 1.5	60% - 90%	11% - 17%
Poor/Below Average Performance	< 2.90	< 2.90	> 20%	< 5.0	< 50	> 40%	< 5	> 0.89	> .62	> 1.33	> 1.5	< 60%	< 11%

Performance Level	Rural	Interrupted	
Good/Above Average Performance	< 0.56	< 1.3	< 3.0
Fair/Average Performance	0.56 - 0.76	> 1.3 & < 2.0	> 3.0 & < 6.0
Poor/Below Average Performance	> 0.76	> 2.0	> 6.0

^Uninterrupted Flow Facility
*Interrupted Flow Facility
[a]2 or 3 or 4 Lane Divided Highway
[b]4 or 5 Lane Undivided Highway
[1]Fringe Urban Operating Environment
[2]Rural Operating Environment

Table 10: Corridor Performance Summary by Segment and Performance Measure (continued)

Segment #	Segment Length (miles)	Safety Performance Area							Freight Performance Area							
		Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors	% of Fatal + Incapacitating Injury Crashes Involving Trucks	% of Fatal + Incapacitating Injury Crashes Involving Motorcycles	% of Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers	Freight Index	Directional TTTI		Directional TPTI		Closure Duration (minutes/milepost/year)		Bridge Vertical Clearance (feet)
			NB/EB	SB/WB						NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	
95N-1*[b2]	7	0.58	0.10	1.05	40%	Insufficient Data	Insufficient Data	20%	0.53	1.08	1.05	2.16	1.61	42.31	0.00	No UP
95N-2*[b1]	8	2.38	3.10	1.66	46%	Insufficient Data	7%	7%	0.24	1.30	1.27	4.31	3.93	15.85	226.25	No UP
95N-3*[b1]	9	2.22	0.73	3.72	34%	Insufficient Data	5%	11%	0.14	1.56	1.61	7.00	7.32	55.89	4.53	No UP
68-4*[a2]	7	1.11	1.25	0.97	100%	Insufficient Data	0%	33%	0.27	1.26	1.24	2.20	5.11	34.11	34.00	No UP
68-5^[a2]	10	2.78	1.82	3.75	46%	Insufficient Data	69%	Insufficient Data	0.45	1.27	1.01	2.05	2.44	44.42	35.24	No UP
68-6^[a1]	5	3.07	4.34	1.80	25%	Insufficient Data	8%	17%	0.63	1.05	1.00	1.46	1.71	128.68	3.56	No UP
68-7^[b1]	5	4.12	4.16	4.08	29%	Insufficient Data	Insufficient Data	18%	0.74	1.00	1.00	1.24	1.45	59.80	43.52	No UP
Weighted Corridor Average		2.25	2.00	2.51	47%	Insufficient Data	21%	16%	0.40	1.25	1.19	3.17	3.62	50.06	52.55	No UP

SCALES

Performance Level	**2 or 3 or 4 Lane Divided Highway**					**Uninterrupted**			**All**	
Good/Above Average Performance	< 0.77	< 44%	< 4%	< 16%	< 2%	> 0.77	< 1.15	< 1.3	< 44.18	> 16.5
Fair/Average Performance	0.77 - 1.23	44% - 54%	4% - 7%	16% - 26%	2% - 4%	0.67 - 0.77	1.15 - 1.33	1.3 - 1.5	44.18-124.86	16.0 - 16.5
Poor/Below Average Performance	> 1.23	> 54%	> 7%	> 26%	> 4%	< 0.67	> 1.33	> 1.5	> 124.86	< 16.0
Performance Level	**4 or 5 Lane Undivided Highway**					**Interrupted**				
Good/Above Average Performance	< 0.80	< 42%	< 6%	< 6%	< 5%	> 0.33	< 1.3	< 3.0		
Fair/Average Performance	0.80 - 1.20	42% - 51%	6% - 10%	6% - 9%	5% - 8%	0.17 - 0.33	1.3 - 2.0	3.0 - 6.0		
Poor/Below Average Performance	> 1.20	> 51%	> 10%	> 9%	> 8%	< 0.17	> 2.0	> 6.0		

^Uninterrupted Flow Facility
*Interrupted Flow Facility
[a]2 or 3 or 4 Lane Divided Highway
[b]4 or 5 Lane Undivided Highway
[1]Fringe Urban Operating Environment
[2]Rural Operating Environment

Notes: *"Insufficient Data" indicates there was not enough data available to generate reliable performance ratings*
"No UP" indicates no underpasses are present in the segment

3.0 NEEDS ASSESSMENT

3.1 Corridor Objectives

Statewide goals and performance measures were established by the ADOT Long-Range Transportation Plan (LRTP) goal and objectives that were updated in 2016. Statewide performance goals that are relevant to SR 68/SR 95 North performance areas were identified and corridor goals were then formulated for each of the five performance areas that aligned with the overall statewide goals established by the LRTP. Based on stakeholder input, corridor goals, corridor objectives, and performance results, three “emphasis areas” were identified for the SR 68/SR 95 North corridor: Pavement, Mobility, and Safety.

Taking into account the corridor goals and identified emphasis areas, performance objectives were developed for each quantifiable performance measure that identify the desired level of performance based on the performance scale levels for the overall corridor and for each segment of the corridor. For the performance emphasis areas, the corridor-wide weighted average performance objectives are identified with a higher standard than for the other performance areas. **Table 11** shows the SR 68/SR 95 North corridor goals, corridor objectives, and performance objectives, and how they align with the statewide goals.

It is not reasonable within a financially constrained environment to expect that every performance measure will always be at the highest levels on every corridor segment. Therefore, individual corridor segment objectives have been set as “fair/average” or better and should not fall below that standard.

Achieving corridor and segment performance objectives will help ensure that investments are targeted toward improvements that support the safe and efficient movement of travelers on the corridor. Addressing current and future congestion, thereby improving mobility on congested segments, will also help the corridor fulfill its potential as a significant contributor to the region’s economy.

Corridor performance is measured against corridor and segment objectives to determine needs – the gap between observed performance and performance objectives.

Goal achievement will improve or reduce current and future congestion, increase travel time reliability, and reduce fatalities and incapacitating injuries resulting from vehicle crashes. Where performance is currently rated “good”, the goal is always to maintain that standard, regardless of whether or not the performance is in an emphasis area.

Table 11: Corridor Performance Goals and Objectives

ADOT Statewide LRTP Goals	SR 68/SR 95 North Corridor Goals	SR 68/SR 95 North Corridor Objectives	Performance Area	Primary Measure	Performance Objective	
				Secondary Measure Indicators	Corridor Average	Segment
Improve Mobility, Reliability, and Accessibility	Improve mobility through additional capacity and improved roadway geometry Provide a safe and reliable route for recreational and tourist travel Provide safe, reliable and efficient connection to all communities along the corridor to permit efficient regional travel Implement critical/cost-effective investments to improve access to multimodal transportation	Reduce current congestion and plan to facilitate future congestion that accounts for anticipated growth, particularly on the SR 95 North portion of the corridor Reduce delays from recurring and non-recurring events to improve reliability Better accommodate bicycle and pedestrian use on the state system Emphasize the deployment of technology to optimize existing system capacity and performance Support and facilitate better accessibility to the statewide multimodal transportation system	Mobility (*Emphasis Area*)	Mobility Index	Good	Fair or better
				Future Daily V/C		
				Existing Peak Hour V/C		
				Closure Extent		
				Directional Travel Time Index		
				Directional Planning Time Index		
				% Bicycle Accommodation		
				% Non-SOV Trips		
Make Cost-Effective Investment Decisions and Support Economic Vitality	Provide a safe, reliable and efficient freight route	Implement the most cost-effective transportation solutions Reduce delays and restrictions to freight movement to improve reliability Improve travel time reliability (including impacts to motorists due to freight traffic)	Freight	Freight Index	Fair or better	Fair or better
				Directional Truck Travel Time Index		
				Directional Truck Planning Time Index		
				Closure Duration		
				Bridge Vertical Clearance		
Preserve and Maintain the System	Maintain, preserve, extend the service life, and modernize State Transportation System infrastructure	Maintain structural integrity of bridges Work with surrounding states to maintain/improve bridges traversing the Colorado River	Bridge	Bridge Index	Fair or better	Fair or better
				Sufficiency Rating		
				% of Deck Area on Functionally Obsolete Bridges		
				Lowest Bridge Rating		
		Improve pavement ride quality for all corridor users Reduce long-term pavement maintenance costs	Pavement *(Emphasis Area)*	Pavement Index	Good	Fair or better
				Directional Pavement Serviceability Rating		
				% Area Failure		
Enhance Safety	Provide a safe, reliable, and efficient connection for the communities along the corridor Improve transportation system safety for all modes	Reduce the number and rate of fatal and incapacitating injury crashes for all roadway users Enhance safety for non-motorized users along the corridor	Safety *(Emphasis Area)*	Safety Index	Above Average	Average or better
				Directional Safety Index		
				% of Crashes Involving SHSP Top 5 Emphasis Areas Behaviors		
				% of Crashes Involving Crash Unit Types		

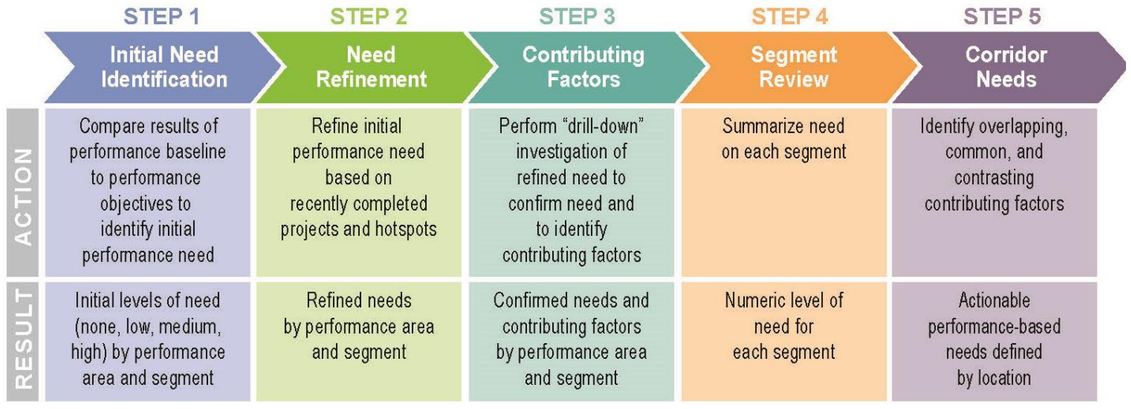
3.2 Needs Assessment Process

The following guiding principles were used as an initial step in developing a framework for the performance-based needs assessment process:

- Corridor needs are defined as the difference between the corridor performance and the performance objectives
- The needs assessment process should be systematic, progressive, and repeatable, but also allow for engineering judgment where needed
- The process should consider all primary and secondary performance measures developed for the study
- The process should develop multiple need levels including programmatic needs for the entire length of the corridor, performance area-specific needs, segment-specific needs, and location-specific needs (defined by MP limits)
- The process should produce actionable needs that can be addressed through strategic investments in corridor preservation, modernization, and expansion

The performance-based needs assessment process is illustrated in **Figure 19** and described in the following sections.

Figure 19: Needs Assessment Process



Step 1: Initial Needs Identification

The first step in the needs assessment process links baseline (existing) corridor performance with performance objectives. In this step, the baseline corridor performance is compared to the performance objectives to provide a starting point for the identification of performance needs. This mathematical comparison results in an initial need rating of None, Low, Medium, or High for each primary and secondary performance measure. An illustrative example of this process is shown below in **Figure 20**.

Figure 20: Initial Need Ratings in Relation to Baseline Performance (Bridge Example)

Performance Thresholds	Performance Level	Initial Level of Need	Description
6.5	Good	None*	All levels of Good and top 1/3 of Fair (>6.0)
	Good		
	Good		
	Fair		
	Fair	Low	Middle 1/3 of Fair (5.5-6.0)
5.0	Fair	Medium	Lower 1/3 of Fair and top 1/3 of Poor (4.5-5.5)
	Poor		
	Poor	High	Lower 2/3 of Poor (<4.5)
	Poor		

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

The initial level of need for each segment is refined to account for hot spots and recently completed or under construction projects, resulting in a final level of need for each segment. The final levels of need for each primary and secondary performance measure are combined to produce a weighted final need rating for each segment. Values of 0, 1, 2, and 3 are assigned to the initial need levels of None, Low, Medium, and High, respectively. A weight of 1.0 is applied to the Performance Index need and equal weights of 0.20 are applied to each need for each secondary performance measure. For directional secondary performance measures, each direction of travel receives a weight of 0.10.

Step 2: Need Refinement

In Step 2, the initial level of need for each segment is refined using the following information and engineering judgment:

- For segments with an initial need of None that contain hot spots, the level of need should be increased from None to Low
- For segments with an initial level of need where recently completed projects or projects under construction are anticipated to partially or fully address the identified need, the level of need should be reduced or eliminated as appropriate
- Programmed projects that are expected to partially or fully address an identified need are not justification to lower the initial need because the programmed projects may not be

implemented as planned; in addition, further investigations may suggest that changes in the scope of a programmed project may be warranted

The resulting final needs are carried forward for further evaluation in Step 3.

Step 3: Contributing Factors
In Step 3, a more detailed review of the condition and performance data available from ADOT is conducted to identify contributing factors to the need. Typically, the same databases used to develop the baseline performance serve as the principal sources for the more detailed analysis. However, other supplemental databases may also be useful sources of information. The databases used for diagnostic analysis are listed below:

Pavement Performance Area

- Pavement Rating Database

Bridge Performance Area

- ABISS

Mobility Performance Area

- Highway Performance Monitoring System (HPMS) Database
- AZTDM
- Real-time traffic conditions data produced by American Digital Cartography Inc. (HERE) Database
- Highway Conditions Reporting System (HCRS) Database

Safety Performance Area

- Crash Database

Freight Performance Area

- HERE Database
- HCRS Database

In addition, other sources considered helpful in identifying contributing factors are:

- Maintenance history (from ADOT PeCoS database for pavement), the level of past investments, or trends in historical data that provide context for pavement and bridge history
- Field observations from ADOT district personnel can be used to provide additional information regarding a need that has been identified
- Previous studies can provide additional information regarding a need that has been identified

Step 3 results in the identification of performance-based needs and contributing factors by segment (and MP locations, if appropriate) that can be addressed through investments in preservation, modernization, and expansion projects to improve corridor performance. See **Appendix D** for more information.

Step 4: Segment Review
In this step, the needs identified in Step 2 and refined in Step 3 are quantified for each segment to numerically estimate the level of need for each segment. Values of 0 to 3 are assigned to the final need levels (from Step 3) of None, Low, Medium, and High, respectively. A weighting factor is applied to the performance areas identified as emphasis areas and a weighted average need is calculated for each segment. The resulting average need score can be used to compare levels of need between segments within a corridor and between segments in different corridors.

Step 5: Corridor Needs
In this step, the needs and contributing factors for each performance area are reviewed on a segment-by-segment basis to identify actionable needs and to facilitate the formation of solution sets that address multiple performance areas and contributing factors. The intent of this process is to identify overlapping, common, and contrasting needs to help develop strategic solutions. This step results in the identification of corridor needs by specific location.

3.3 Corridor Needs Assessment

This section documents the results of the needs assessment process described in the prior section. The needs in each performance area were classified as either None, Low, Medium, or High based on how well each segment performed in the existing performance analysis. The needs for each segment were numerically combined to estimate the average level of need for each segment of the corridor

The final needs assessments for each performance measure, along with the scales used in analysis, are shown in **Table 12** through **Table 16**.

Pavement Needs Refinement and Contributing Factors

- No changes were made to the level of need to account for hot spots
- There are a few recently completed projects along the corridor but they did not substantially affect the overall segment performance so no changes were made to the level of need
- There are no segments along the corridor with potential pavement repetitive historical investment issues
- See **Appendix D** for detailed information on contributing factors

Table 12: Final Pavement Needs

Segment #	Performance Score and Level of Need				Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Pavement Index	Directional PSR		% Area Failure				
		NB/EB	SB/WB					
95N-1	3.55	3.33	3.33	15%	0.40	MP 232-233	Pavement preservation project (full-width microsurfacing, replacing pavement markings, and other misc work), advertised in 2017, MP 226.08 to 240.00	Low
95N-2	3.22	3.03	3.03	38%	2.00	MP 233-234, MP 236-238	Pavement preservation project (full-width microsurfacing, replacing pavement markings, and other misc work), advertised in 2017, MP 226.08 to 240.00	Medium
95N-3	3.45	3.23	3.23	22%	0.60	MP 248-250	Roadway improvements (paving and new curbs, gutters, sidewalks, and raised medians), 2017 MP 249.50-250.00	Low
68-4	3.95	3.78	3.75	0%	0.00	None	None	None
68-5	3.73	3.61	3.45	0%	0.00	None	None	None
68-6	3.62	3.35	3.26	0%	0.10	None	None	Low
68-7	3.83	3.51	3.51	0%	0.00	None	None	None

Level of Need (Score)	Performance Score Need Scale		Segment Level Need Scale
None* (0)	> 3.30	< 10%	0
Low (1)	3.10 - 3.30	10% - 15%	< 1.5
Medium (2)	2.70 - 3.10	15% - 25%	1.5 - 2.5
High (3)	< 2.70	> 25%	> 2.5

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Bridge Needs Refinement and Contributing Factors

- No changes were made to the level of need to account for hot spots or recently completed projects
- One bridge (Needles Bridge #2435 at MP 226.07 in Segment 95N-1) is a bridge hot spot due to a deck rating of 4 but it does not have potential repetitive historical investment issues
- One bridge (Laughlin Br-Colo Rvr #2539 at MP 250.00 in Segment 95N-3) has potential repetitive historical investment issues, an evaluation rating of 5, and is considered functionally obsolete, but it is not a bridge hot spot
- See **Appendix D** for detailed information on contributing factors

Table 13: Final Bridge Needs

Segment #	Performance Score and Level of Need				Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Bridge Index	Sufficiency Rating	% of Deck on Functionally Obsolete Bridges	Lowest Bridge Rating				
95N-1	4.00	80.90	0.00%	4.00	3.4	Needles Bridge #2435 (MP 226.07)	None	High
95N-2	No Bridges				None	None	None	None
95N-3	5.00	49.80	100.00%	5.00	2.9	None	None	High
68-4	6.00	87.50	0.00%	6.00	0.0	None	None	None
68-5	6.38	94.63	0.00%	6.00	0.0	None	None	None
68-6	6.32	99.60	0.00%	6.00	0.0	None	None	None
68-7	6.00	98.20	0.00%	6.00	0.0	None	None	None

Level of Need (Score)	Performance Score Need Scale				Segment Level Need Scale
None (0)	≥ 6.0	≥ 70	≤ 21.0%	> 5	0
Low (1)	5.5 - 6.0	60 - 70	21.0% - 31.0%	5	< 1.5
Medium (2)	4.5 - 5.5	40 - 60	31.0% - 49.0%	4	1.5 - 2.5
High (3)	≤ 4.5	≤ 40	≥ 49.0%	< 4	> 2.5

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Mobility Needs Refinement and Contributing Factors

- There are a few recently completed projects along the corridor but they did not substantially affect the overall segment performance so no changes were made to the level of need
- See **Appendix D** for detailed information on contributing factors

Table 14: Final Mobility Needs

Segment #	Performance Score and Level of Need											Initial Segment Need	Recently Completed Projects	Final Segment Need
	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent		Directional TTI		Directional PTI		% Bicycle Accommodation			
			NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB				
95N-1[b]	0.65	0.86	0.45	0.45	0.37	0.00	1.04	1.01	1.89	1.54	22%	2.3	None	Medium
95N-2[b]	0.89	1.09	0.67	0.68	0.13	1.38	1.22	1.19	3.43	3.22	1%	3.5	None	High
95N-3[b]	1.32	1.84	0.68	0.66	0.64	0.07	1.46	1.44	8.27	5.63	0%	4.9	Intersection improvements, 2015 (MP 249.8); Roadway improvements (paving and new curbs, gutters, sidewalks, and raised medians), 2017 (Aviation Way [MP 249.5) to Laughlin Bridge [MP 250.0])	High
68-4[b]	0.40	0.50	0.26	0.26	0.23	0.20	1.05	1.11	1.94	3.28	74%	0.2	None	Low
68-5[a]	0.20	0.22	0.17	0.17	0.26	0.16	1.06	1.03	1.71	1.39	100%	0.4	None	Low
68-6[a]	0.14	0.15	0.12	0.12	0.36	0.04	1.01	1.01	1.34	1.27	98%	0.1	Construct turn lanes, MP 19.8 (2016)	Low
68-7[a]	0.18	0.19	0.15	0.11	0.52	0.36	1.00	1.00	1.29	1.21	98%	0.3	None	Low

Level of Need (Score)	Performance Score Need Scale					Segment Level Need Scale
None* (0)	≤ 0.77 (Urban) ≤ 0.63 (Rural)	< 0.35	< 1.21[a] < 1.53[b]	< 1.37[a] < 4.00[b]	> 80%	0
Low (1)	0.77 - 0.83 (Urban) 0.63 - 0.69 (Rural)	0.35 - 0.49	1.21 - 1.27[a] 1.53 - 1.77[b]	1.37 - 1.43[a] 4.00 - 5.00[b]	70% - 80%	< 1.5
Medium (2)	0.83 - 0.95 (Urban) 0.69 - 0.83 (Rural)	0.49 - 0.75	1.27 - 1.39[a] 1.77 - 2.23[b]	1.43 - 1.57[a] 5.00 - 7.00[b]	50% - 70%	1.5 - 2.5
High (3)	≥ 0.95 (Urban) ≥ 0.83 (Rural)	> 0.75	> 1.39[a] > 2.23[b]	> 1.57[a] > 7.00[b]	< 50%	> 2.5

a: Uninterrupted
b: Interrupted

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Safety Needs Refinements and Contributing Factors

- No changes were made to the level of need to account for hot spots
- Safety hot spots are present in every segment excluding Segment 68-4, but these segments already have a level of need of Low or higher
- There are a few recently completed projects along the corridor but they did not substantially affect the overall segment performance so no changes were made to the level of need
- See **Appendix D** for detailed information on contributing factors

Table 15: Final Safety Needs

Segment #	Performance Score and Level of Need							Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Area Behaviors	% of Fatal + Incapacitating Injury Crashes Involving Trucks	% of Fatal + Incapacitating Injury Crashes Involving Motorcycles	% of Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers				
		NB/EB	SB/WB								
95N-1[b]	0.58	0.10	1.05	40%	Insufficient Data	Insufficient Data	20%	0.7	MP 226-227	None	Low
95N-2[b]	2.38	3.10	1.66	46%	Insufficient Data	7%	7%	4.4	MP 234-241	None	High
95N-3[b]	2.22	0.73	3.72	34%	Insufficient Data	5%	11%	3.9	MP 241-250	Lighting and Pedestrian Safety improvements, Thunderstruck Drive to 7th Street (MP 244.2-248.9), 2012-2013; Intersection improvements, 2015 (MP 249.8); Roadway improvements (paving and new curbs, gutters, sidewalks, and raised medians), 2017 (Aviation Way [MP 249.5) to Laughlin Bridge [MP 250.0])	High
68-4[a]	1.11	1.25	0.97	100%	Insufficient Data	0%	33%	3.5	None	None	High
68-5[a]	2.78	1.82	3.75	46%	Insufficient Data	69%	Insufficient Data	4.2	MP 8-11	None	High
68-6[a]	3.07	4.34	1.80	25%	Insufficient Data	8%	17%	4.2	MP 17-20, MP 21-22	Construct turn lanes, MP 19.8 (2016)	High
68-7[a]	4.12	4.16	4.08	29%	Insufficient Data	Insufficient Data	18%	4.2	MP 22-27	None	High

Level of Need (Score)		Performance Score Needs Scale					Segment Level Need Scale
None* (0)	a	≤ 0.92	≤ 47%	≤ 5%	≤ 19%	≤ 3%	0
	b	≤ 0.93	≤ 45%	≤ 7%	≤ 7%	≤ 6%	
Low (1)	a	0.92 - 1.07	47% - 50%	5% - 6%	19% - 22%	3% - 4%	≤ 1.5
	b	0.93 - 1.06	45% - 48%	7% - 8%	7% - 8%	6% - 7%	
Medium (2)	a	1.07 – 1.38	50% - 57%	6% - 8%	22% - 29%	4% - 5%	1.5 - 2.5
	b	1.06 - 1.33	48% - 54%	8% - 11%	8% - 10%	7% - 9%	
High (3)	a	≥ 1.38	≥ 57%	≥ 8%	≥ 29%	≥ 5%	≥ 2.5
	b	≥ 1.33	≥ 54%	≥ 11%	≥ 10%	≥ 9%	

a: 2 or 3 or 4 Lane Divided Highway
b: 4 or 5 Lane Undivided Highway

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Freight Needs Refinements and Contributing Factors

- No changes were made to the level of need to account for hot spots as there are no bridge vertical clearance hot spots on the corridor
- There are a few recently completed projects along the corridor but they did not substantially affect the overall segment performance so no changes were made to the level of need
- See **Appendix D** for detailed information on contributing factors

Table 16: Final Freight Needs

Segment #	Performance Score and Level of Need								Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Freight Index	Directional TTI		Directional PTI		Closure Duration		Bridge Vertical Clearance				
		NB	SB	NB	SB	NB	SB					
95N-1[b]	0.53	1.08	1.05	2.16	1.61	42.31	0.00	No UP	0.0	None	None	None
95N-2[b]	0.24	1.30	1.27	4.31	3.93	15.85	226.25	No UP	1.4	None	None	Low
95N-3[b]	0.14	1.56	1.61	7.00	7.32	55.89	4.53	No UP	2.8	None	Intersection improvements, 2015 (MP 249.8); Roadway improvements (paving and new curbs, gutters, sidewalks, and raised medians), 2017 (Aviation Way [MP 249.5) to Laughlin Bridge)	High
68-4[b]	0.27	1.26	1.24	2.20	5.11	34.11	34.00	No UP	1.2	None	None	Low
68-5[a]	0.45	1.27	1.01	2.05	2.44	44.42	35.24	No UP	3.8	None	None	High
68-6[a]	0.63	1.05	1.00	1.46	1.71	128.68	3.56	No UP	3.7	None	Construct turn lanes, MP 19.8 (2016)	High
68-7[a]	0.74	1.00	1.00	1.24	1.45	59.80	43.52	No UP	0.2	None	None	Low

Level of Need (Score)		Performance Score Need Scale					Segment Level Need Scale
None* (0)	a	≥ 0.74	≤ 1.21	≤ 1.37	≤ 71.07	≥ 16.33	0
	b	≥ 0.28	≤ 1.53	≤ 4.00			
Low (1)	a	0.70 - 0.74	1.21 - 1.27	1.37 - 1.43	71.07 - 97.97	16.17 - 16.33	≤ 1.5
	b	0.22 - 0.28	1.53 - 1.77	4.00 - 5.00			
Medium (2)	a	0.64 - 0.70	1.27 - 1.39	1.43 - 1.57	97.97 - 151.75	15.83 - 16.17	1.5 - 2.5
	b	0.12 - 0.22	1.77 - 2.23	5.00 - 7.00			
High (3)	a	≤ 0.64	≥ 1.39	≥ 1.57	≥ 151.75	≤ 15.83	≥ 2.5
	b	≤ 0.12	≥ 2.23	≥ 7.00			

a: Uninterrupted Flow
b: Interrupted Flow

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Segment Review

The needs for each segment were combined to numerically estimate the average level of need for each segment of the corridor. **Table 17** provides a summary of needs for each segment across all performance areas, with the average need score for each segment presented in the last row of the table. A weighting factor of 1.5 is applied to the need scores of the performance areas identified as emphasis areas (Pavement, Mobility, and Safety for the SR 68/SR 95 North corridor). There is one segment with a High average need, Segment 95N-3. Six segments have a Medium average need.

Table 17: Summary of Needs by Segment

Performance Area	Segment Number and Mileposts (MP)						
	95N-1	95N-2	95N-3	68-4	68-5	68-6	68-7
	MP 226-233	MP 233-241	MP 241-250	MP 0-7	MP 7-17	MP 17-22	MP 22-27
Pavement*	Low	Medium	Low	None	None	Low	None
Bridge	High	None	High	None	None	None	None
Mobility*	Medium	High	High	Low	Low	Low	Low
Safety*	Low	High	High	High	High	High	High
Freight	None	Low	High	Low	High	High	Low
Average Need	**1.38**	**2.00**	**2.54**	**1.08**	**1.38**	**1.62**	**1.08**

* Identified as Emphasis Areas for SR 68/SR 95 North Corridor
[#] N/A indicates insufficient or no data available to determine level of need
[+] A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study

Level of Need	Average Need Range
None[+]	< 0.1
Low	0.1 - 1.0
Medium	1.0 - 2.0
High	> 2.0

Summary of Corridor

The needs in each performance area are shown in **Figure 21** and summarized below:

Pavement Needs

- Three segments (95N-1, 95N-2, and 95N-3) contain Pavement hot spots
- Segment 95N-2 has a final segment need of Medium while Segments 95N-1, 95N-3, and 68-6 have a final segment need of Low; all other segments on the corridor have a final segment need of None
- No segments were identified as having potential pavement repetitive historical investment issues

Bridge Needs

- One segment (95N-1) has a Bridge hot spot but it does not have potential repetitive historical investment issues
- One bridge in Segment 95N-3 has potential repetitive historical investment issues, an evaluation rating of 5, and is considered functionally obsolete, but it is not a bridge hot spot
- Segments 95N-1 and 95N-3 have a final segment need of High; all other segments on the corridor have a final segment need of None

Mobility Needs

- Segments 95N-2 and 95N-3 have a final segment need of High; Segment 95N-1 has a final segment need of Medium; all other segments on the corridor have a final segment need of Low
- Mobility needs are primarily related to high existing and projected traffic volumes, high PTI, and lack of bicycle accommodation

Safety Needs

- All segments have a final segment need of High except Segment 95N-1, which has a final segment need of Low
- Safety hot spots exist in all segments except Segment 68-4
- Contributing factors to the Safety needs include lack of access control, numerous driveways, high traffic volumes, and speeding
- Crashes involving non-motorized travelers (i.e., pedestrians and bicyclists) are above the statewide average for five of the seven corridor segments

Freight Needs

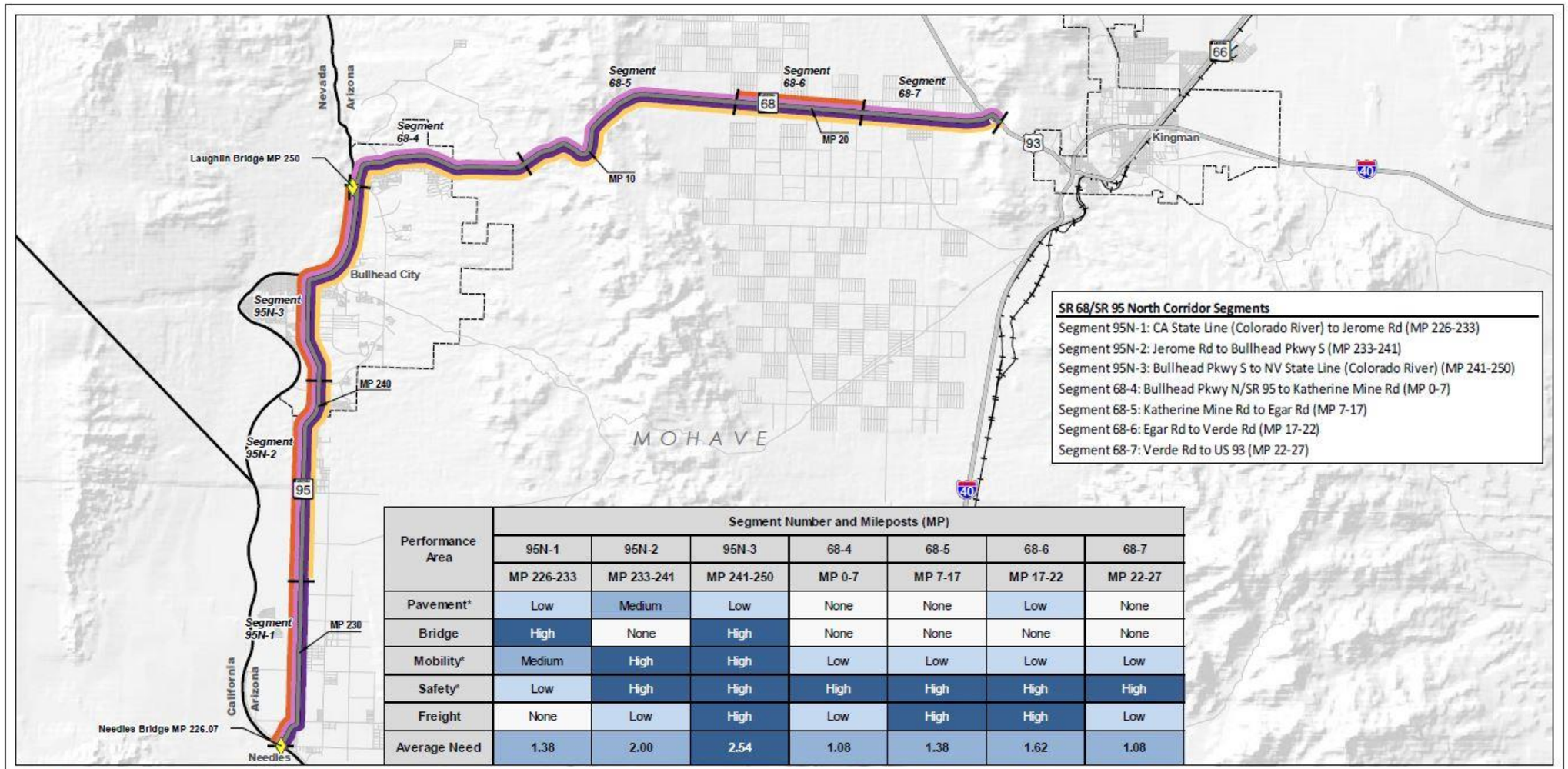
- No Freight hot spots exist along the corridor
- Segments 95N-3, 68-5, and 68-6 have a final segment need of High while Segments 95N-2, 68-4, and 68-7 have a final segment need of Low; all other segments on the corridor have a final segment need of None
- Freight needs are primarily related to high PTI

Overlapping Needs

This section identifies overlapping performance needs on the SR 68/SR 95 North corridor, which provides guidance to develop strategic solutions that address more than one performance area with elevated levels of need (i.e., Medium or High). Completing projects that address multiple needs presents the opportunity to more effectively improve overall performance. A summary of the overlapping needs that relate to locations with elevated levels of need is provided below:

- Segment 95N-1 contains elevated needs in the Bridge and Mobility performance areas
- Segment 95N-2 contains elevated needs in the Pavement, Mobility, and Safety performance areas
- Segment 95N-3, which has the highest average need score of all the segments of the corridor, has elevated needs in Bridge, Mobility, Safety, and Freight
- Segments 68-5 and 68-6 contain elevated needs in the Safety and Freight performance areas

Figure 21 Corridor Needs Summary



Performance Area	Segment Number and Mileposts (MP)						
	95N-1	95N-2	95N-3	68-4	68-5	68-6	68-7
	MP 226-233	MP 233-241	MP 241-250	MP 0-7	MP 7-17	MP 17-22	MP 22-27
Pavement*	Low	Medium	Low	None	None	Low	None
Bridge	High	None	High	None	None	None	None
Mobility*	Medium	High	High	Low	Low	Low	Low
Safety*	Low	High	High	High	High	High	High
Freight	None	Low	High	Low	High	High	Low
Average Need	1.38	2.00	2.54	1.08	1.38	1.62	1.08

* Identified as Emphasis Areas for SR 68/SR 95 North Corridor
# N/A indicates insufficient or no data available to determine level of need
˙ A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study

Level of Need	Average Need
None˙	< 0.1
Low	0.1 - 1.0
Medium	1.0 - 2.0
High	> 2.0

SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Needs Summary

Appendix A: Corridor Performance Maps

This appendix contains maps of each primary and secondary measure associated with the five performance areas for the SR 68/SR 95 North corridor. The following are the areas and maps included:

Pavement Performance Area:

- Pavement Index and Hot Spots
- Pavement Serviceability (directional)
- Percentage of Pavement Area Failure

Bridge Performance Area:

- Bridge Index and Hot Spots
- Bridge Sufficiency
- Percent of Deck Area on Functionally Obsolete Bridges
- Lowest Bridge Rating

Mobility Performance Area:

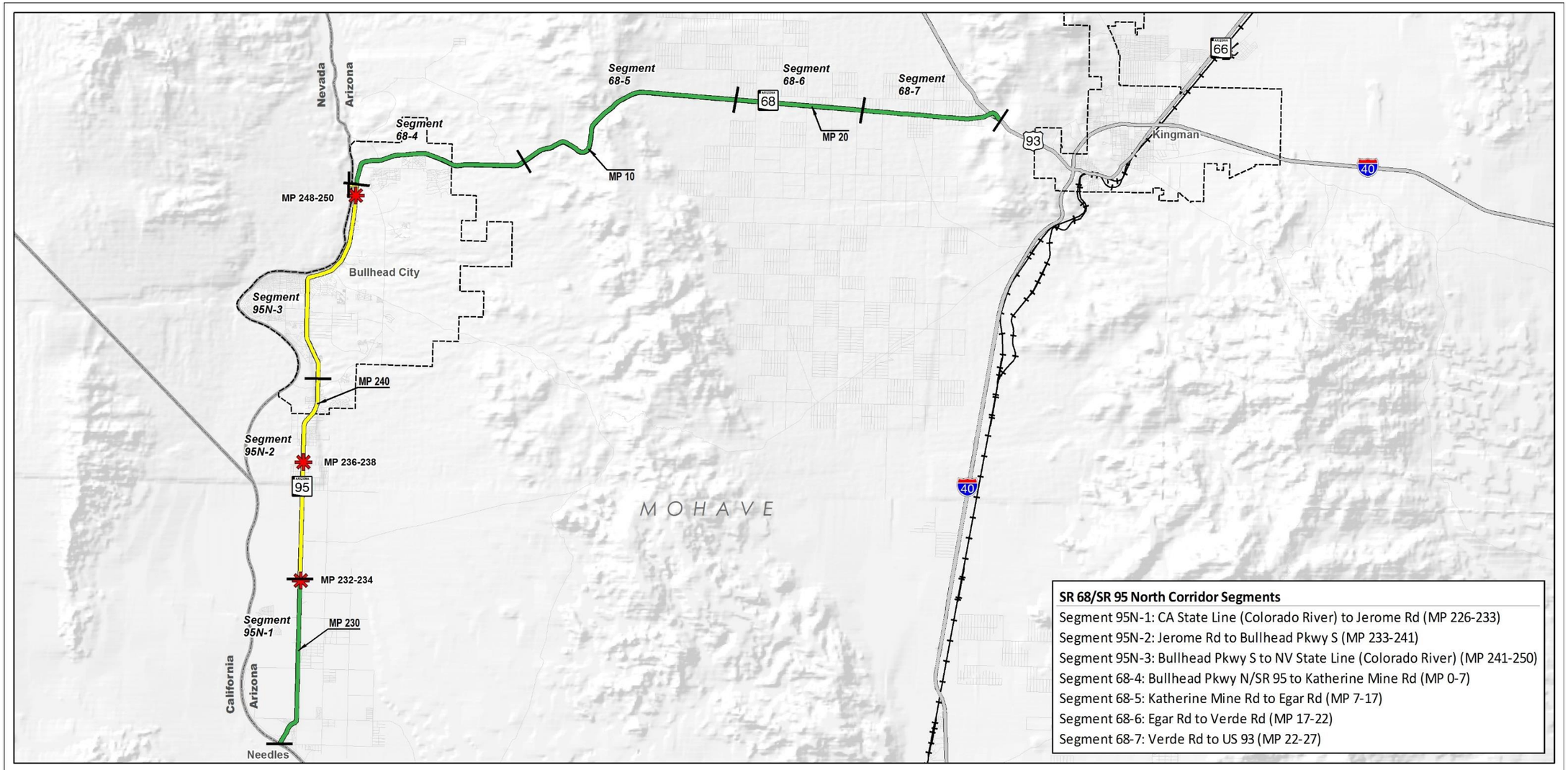
- Mobility Index
- Future Daily V/C
- Existing Peak V/C (directional)
- Average Instances Per Year a Given Milepost is Closed Per Segment Mile
- All Vehicles Travel Time Index
- All Vehicles Planning Time Index
- Multimodal Opportunities
- Percentage of Bicycle Accommodation

Safety Performance Area:

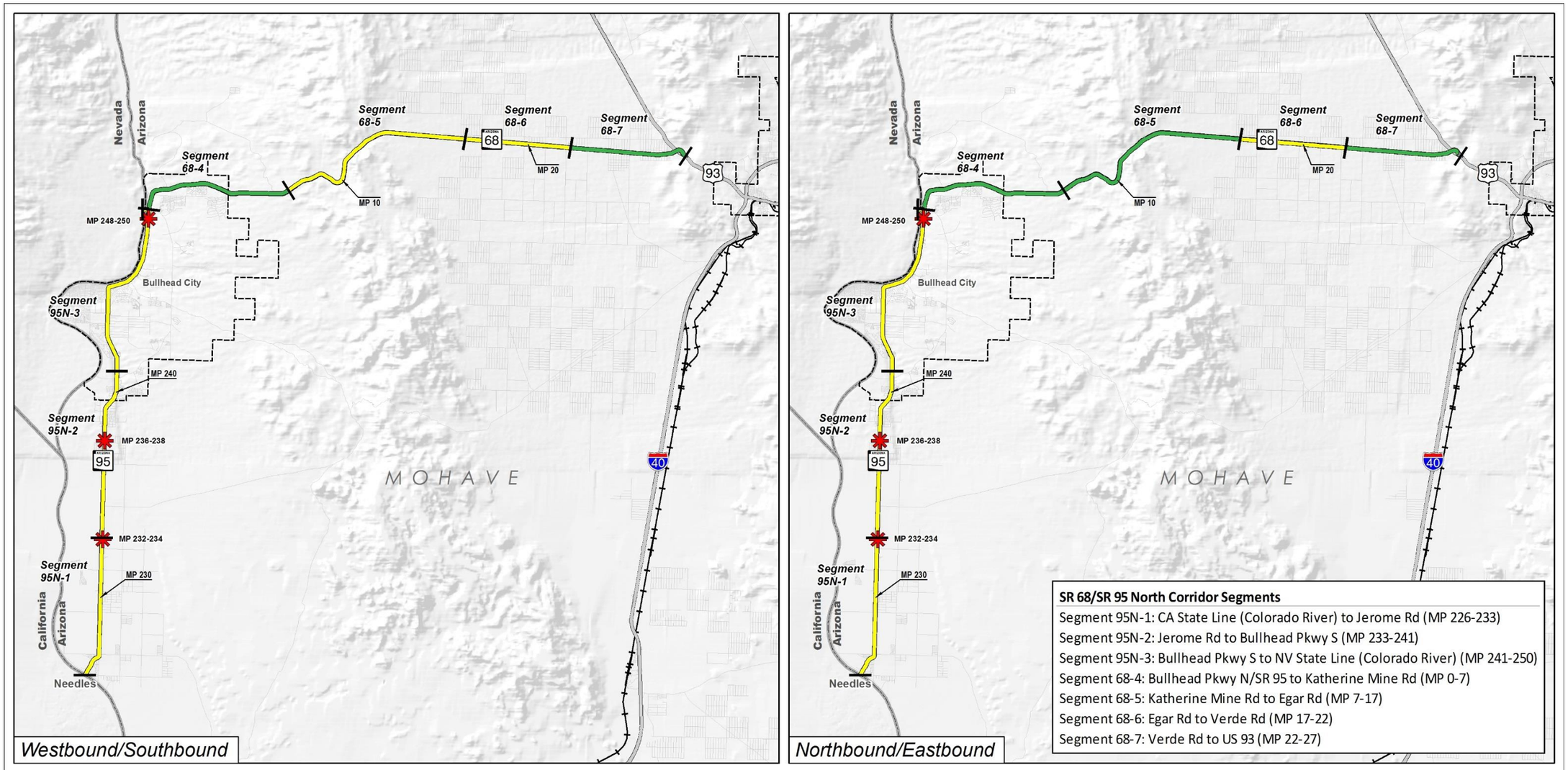
- Safety Index and Hot Spots
- Safety Index and Hot Spots (directional)
- Relative Frequency of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors Compared to the Statewide Average for Similar Segments
- Relative Frequency of Fatal + Incapacitating Injury Crashes Involving Motorcycles Compared to the Statewide Average for Similar Segments
- Relative Frequency of Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers Compared to the Statewide Average for Similar Segments

Freight Performance Area:

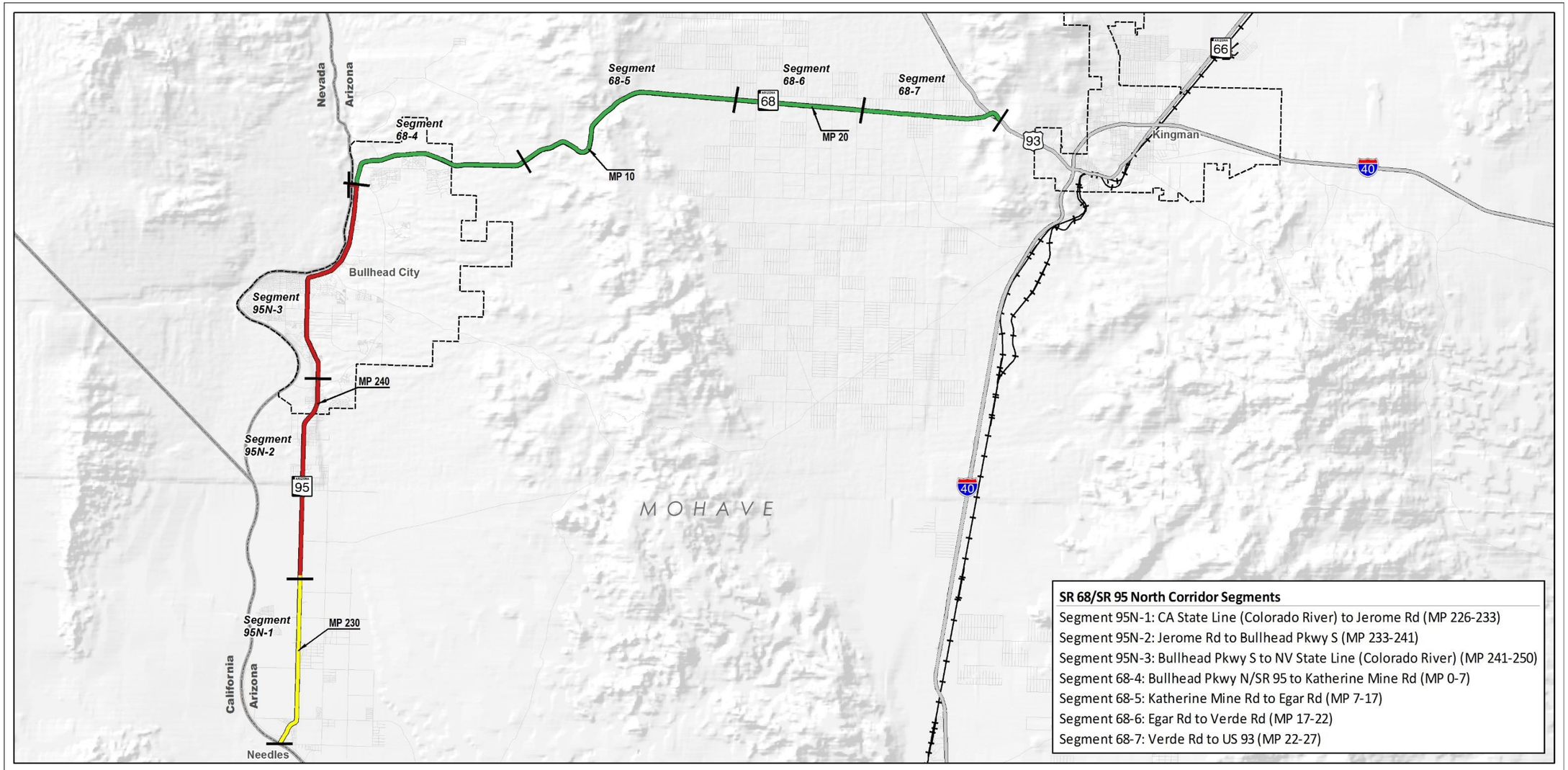
- Freight Index and Hot Spots
- Truck Travel Time Index
- Truck Planning Time Index
- Average Minutes Per Year Given Milepost is Closed Per Segment Mile
- Bridge Vertical Clearance



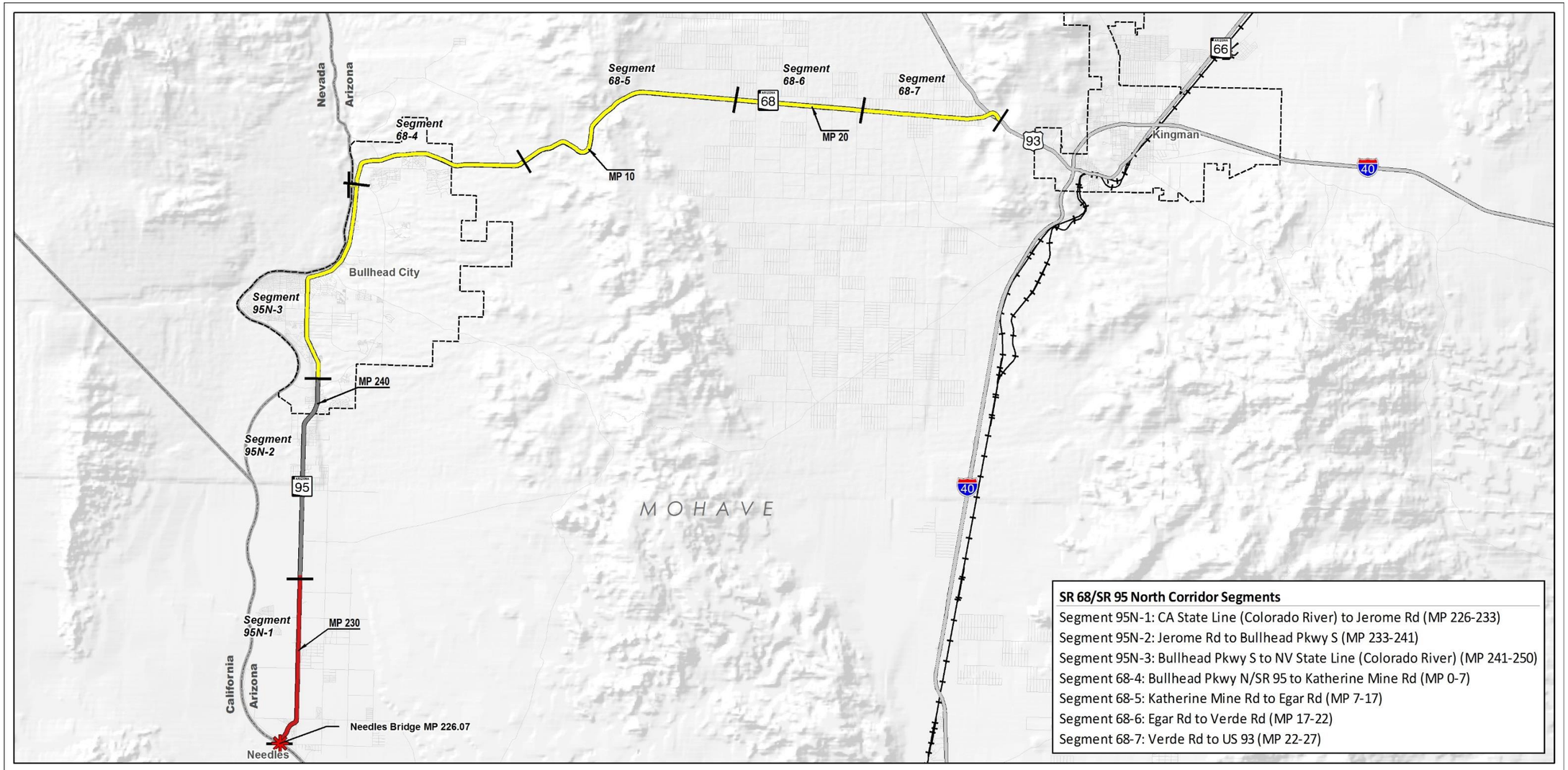
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Pavement Index and Hot Spots
2015-2016 Data



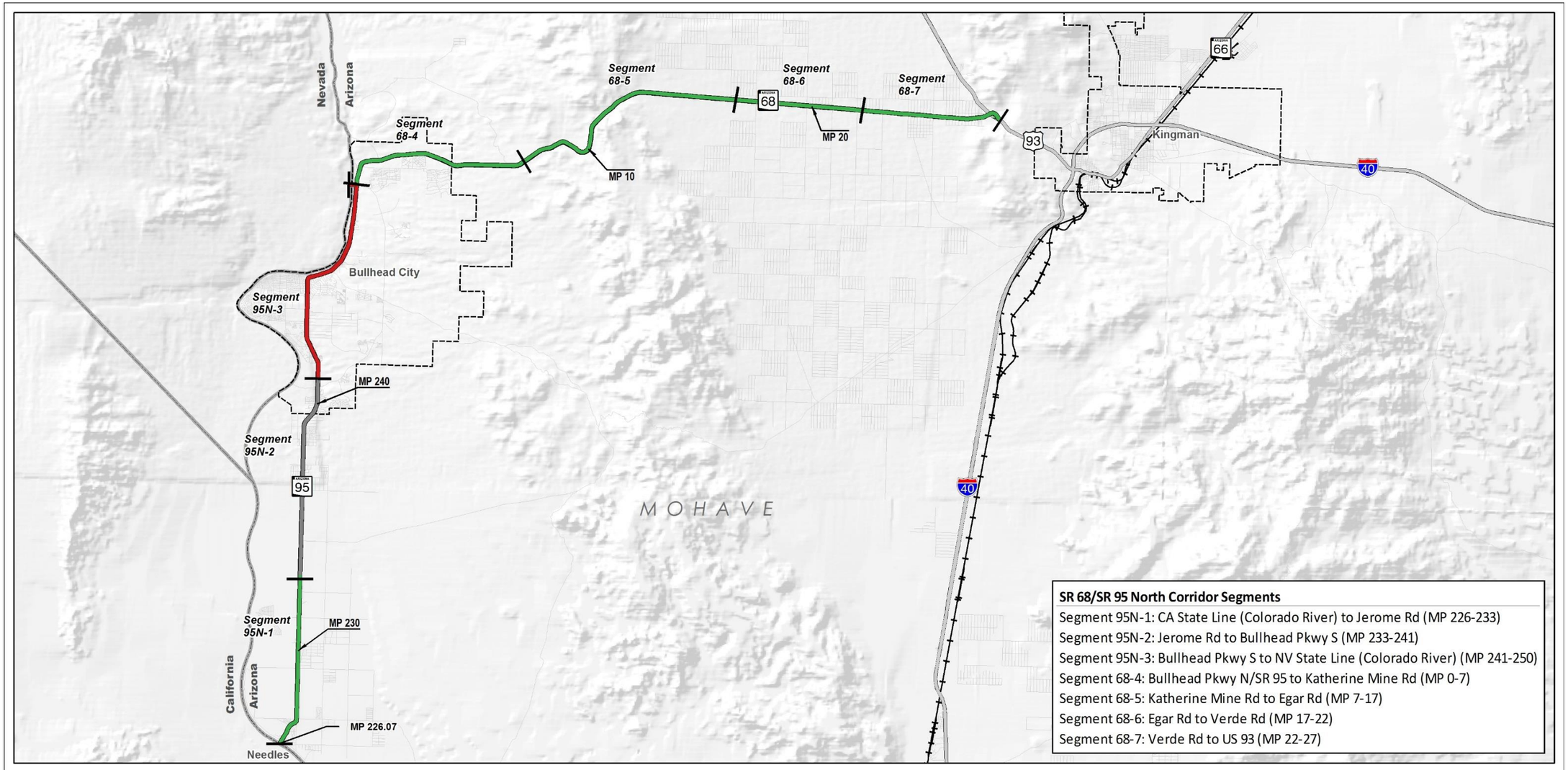
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Pavement Serviceability and Hot Spots
2015-2016 Data



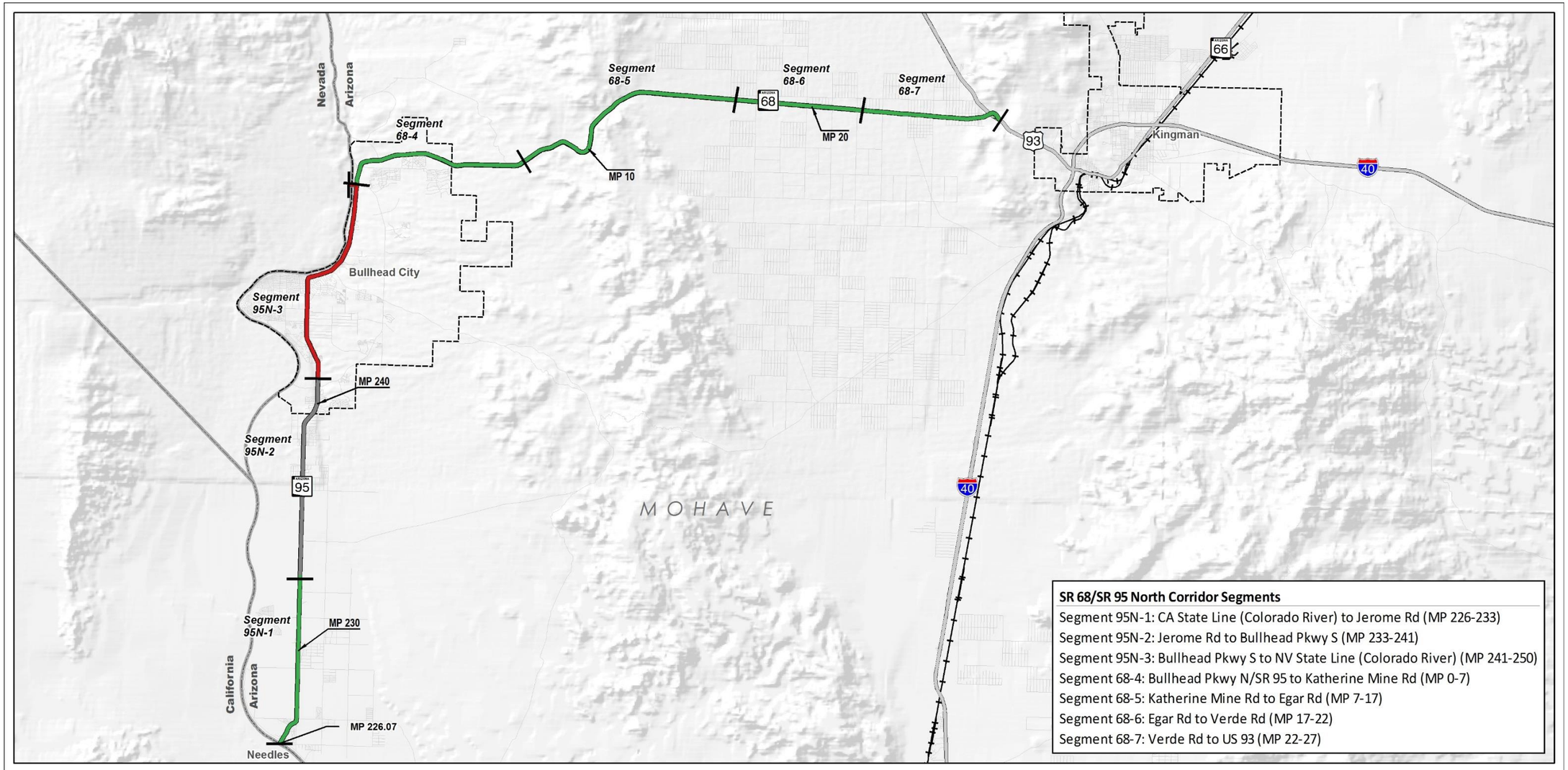
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Percentage of Pavement Area Failure
2015-2016 Data



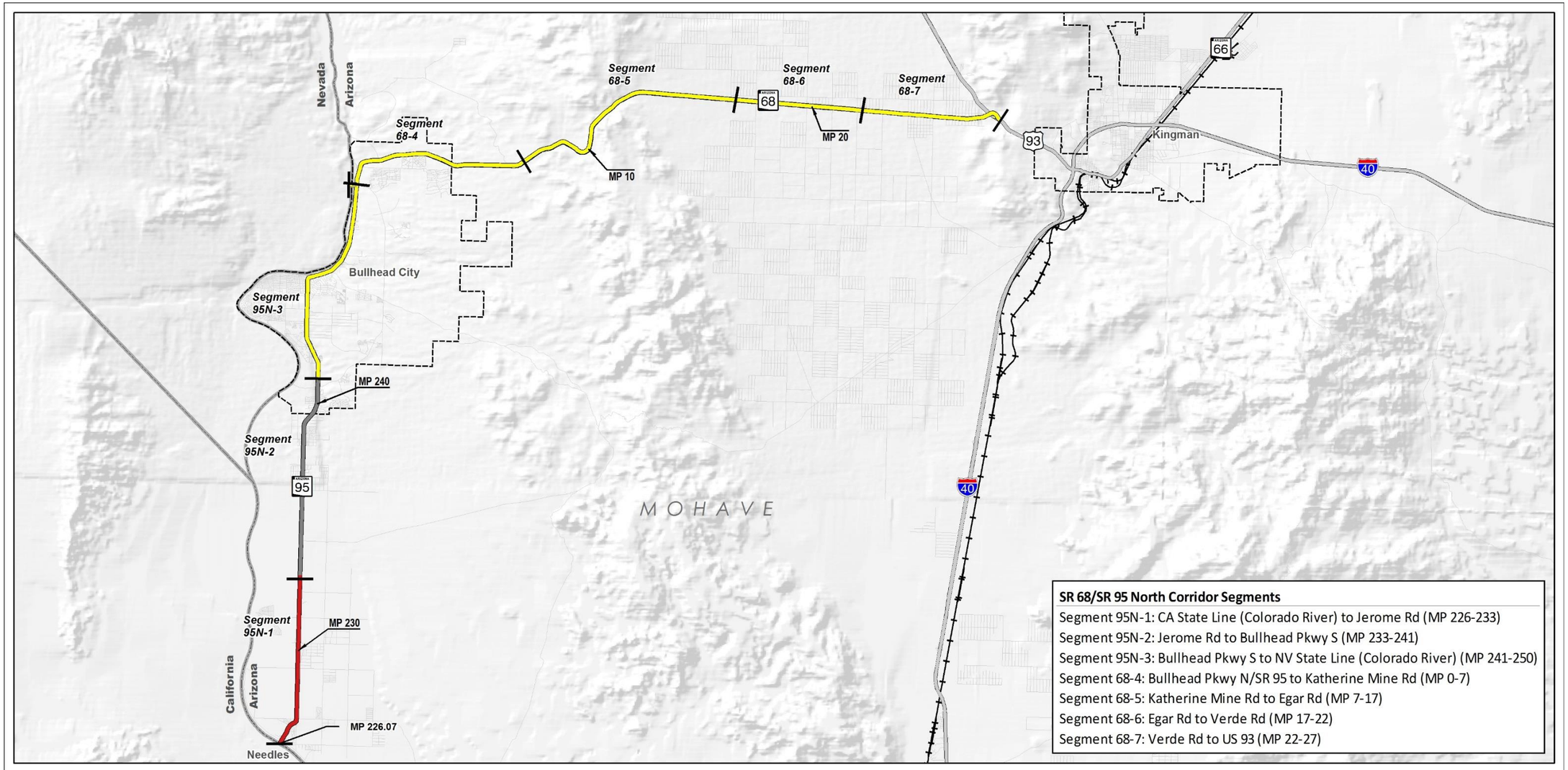
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Bridge Index and Hot Spots
2015 - 2016 Data



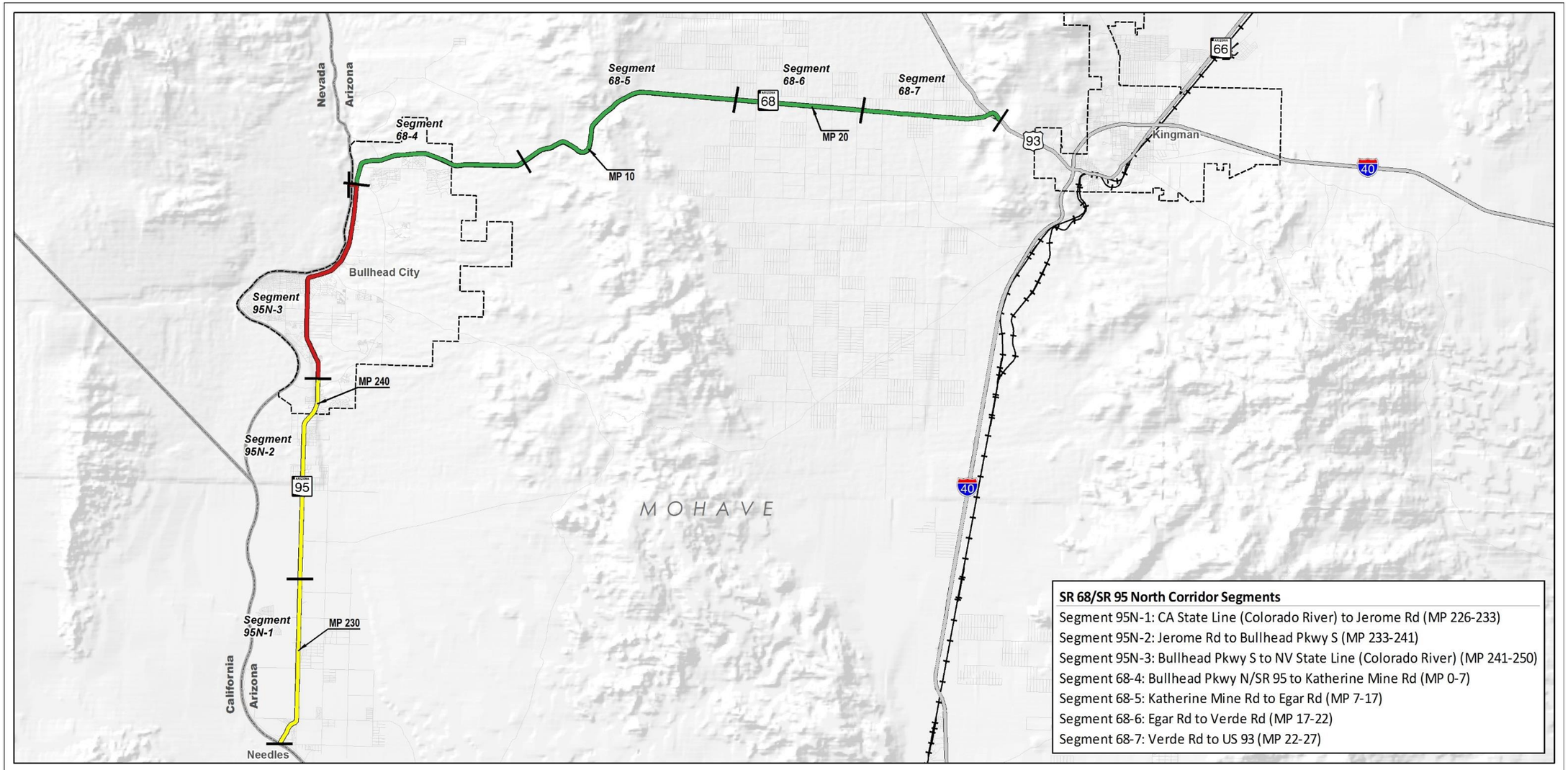
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Bridge Sufficiency
2015 - 2016 Data



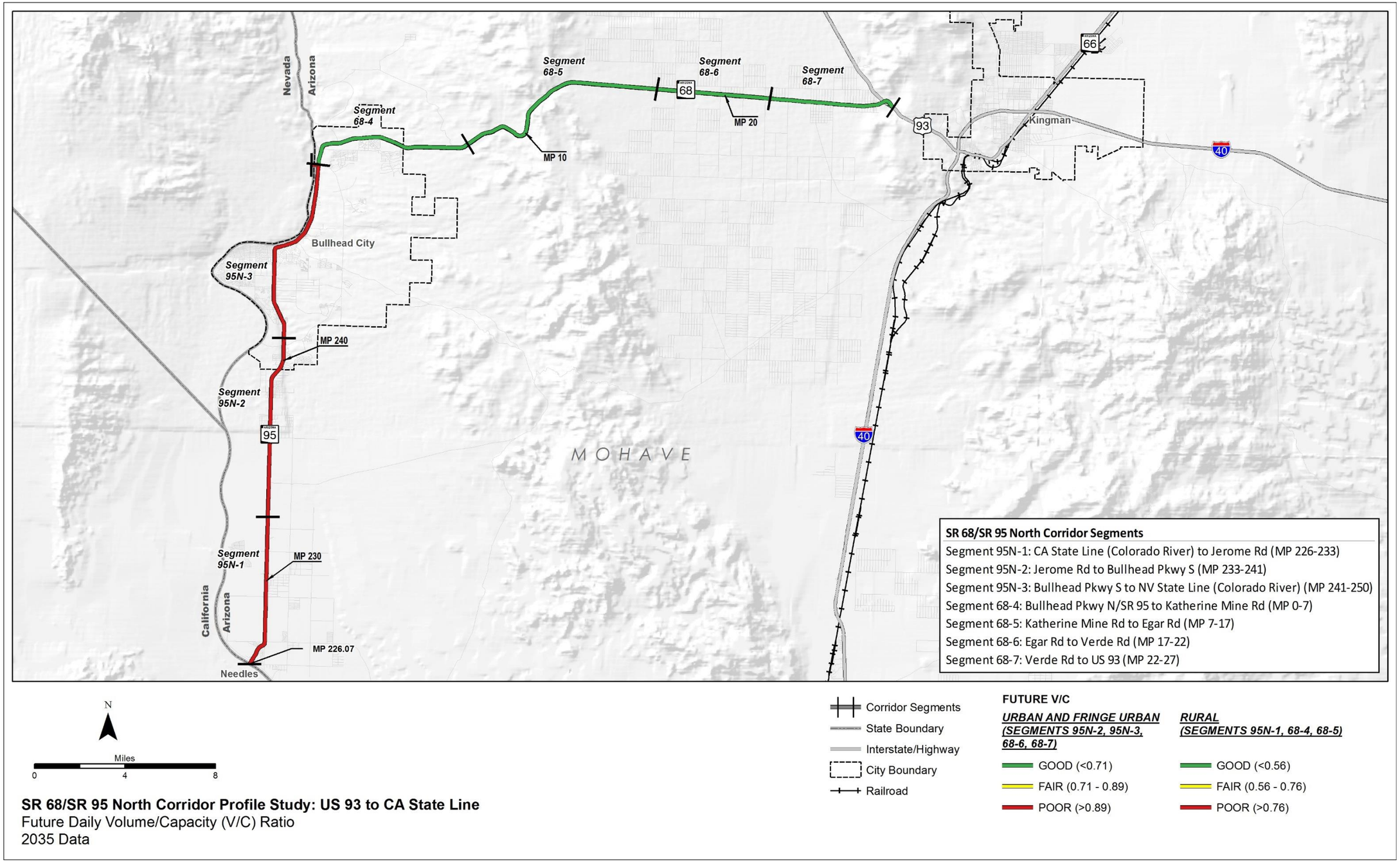
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Percentage of Deck Area on Functionally Obsolete Bridges
2015 - 2016 Data



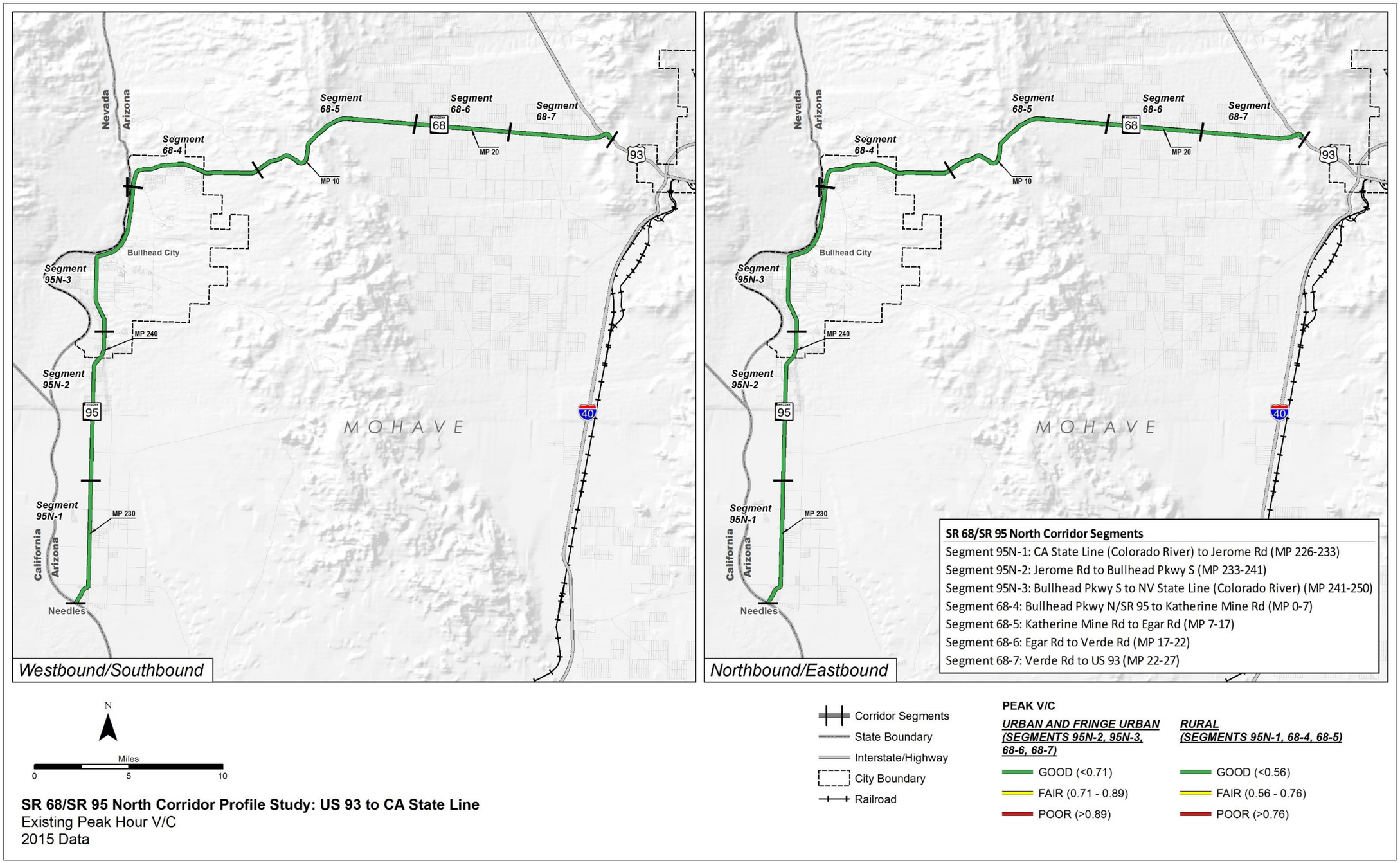
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Lowest Bridge Rating
2015 - 2016 Data



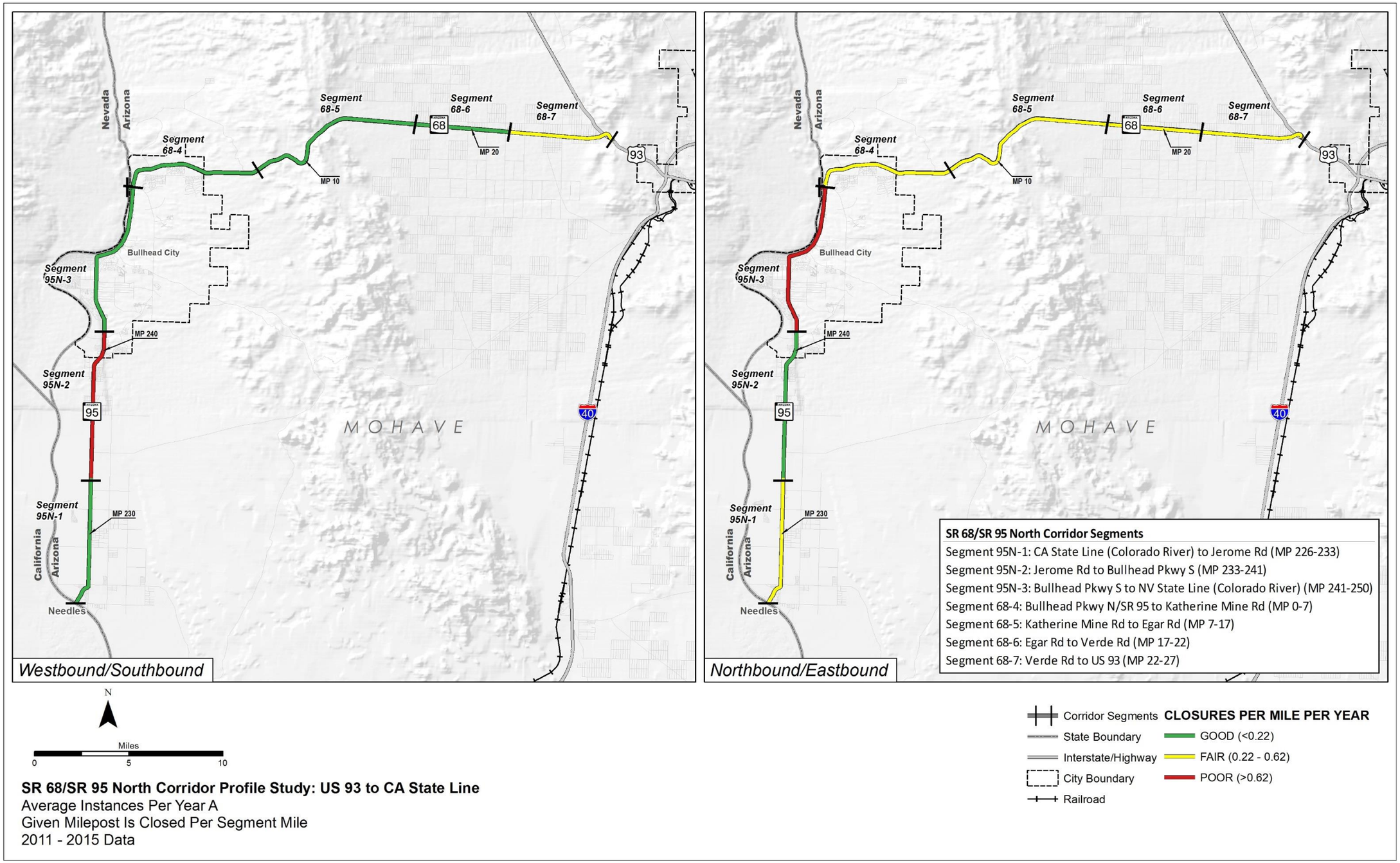
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Mobility Index
2015 and 2035 Data



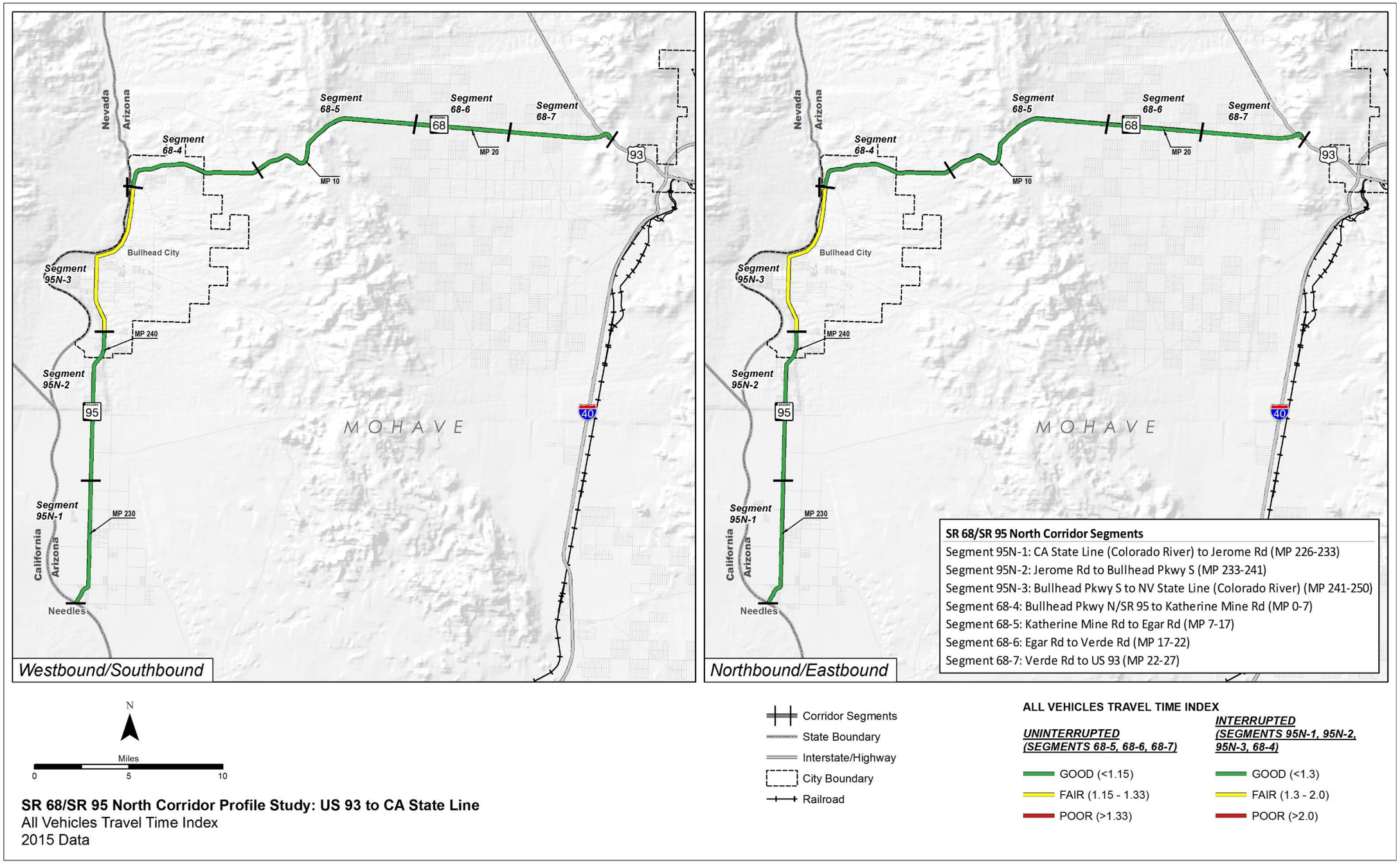
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Future Daily Volume/Capacity (V/C) Ratio
2035 Data



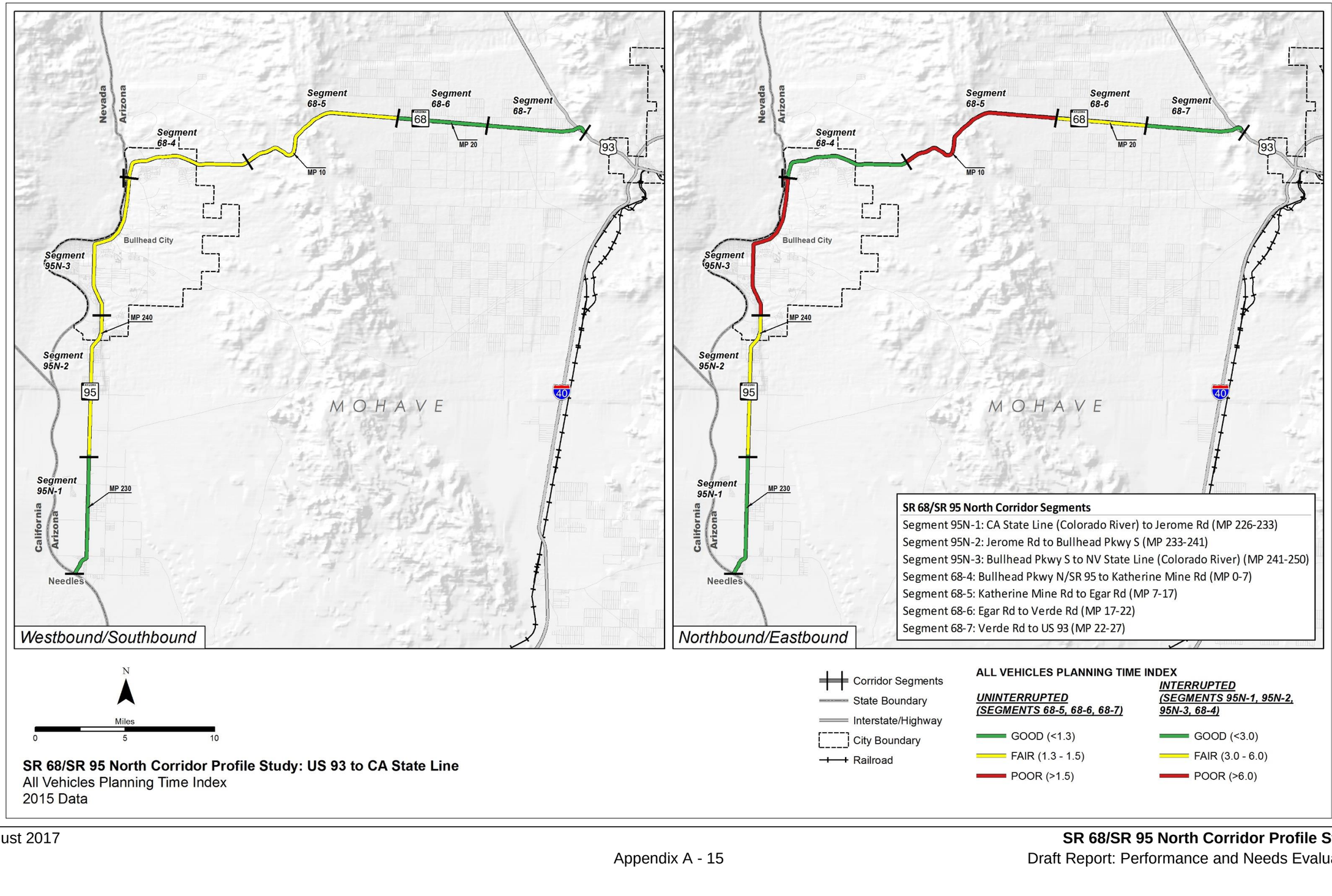
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Existing Peak Hour V/C
2015 Data



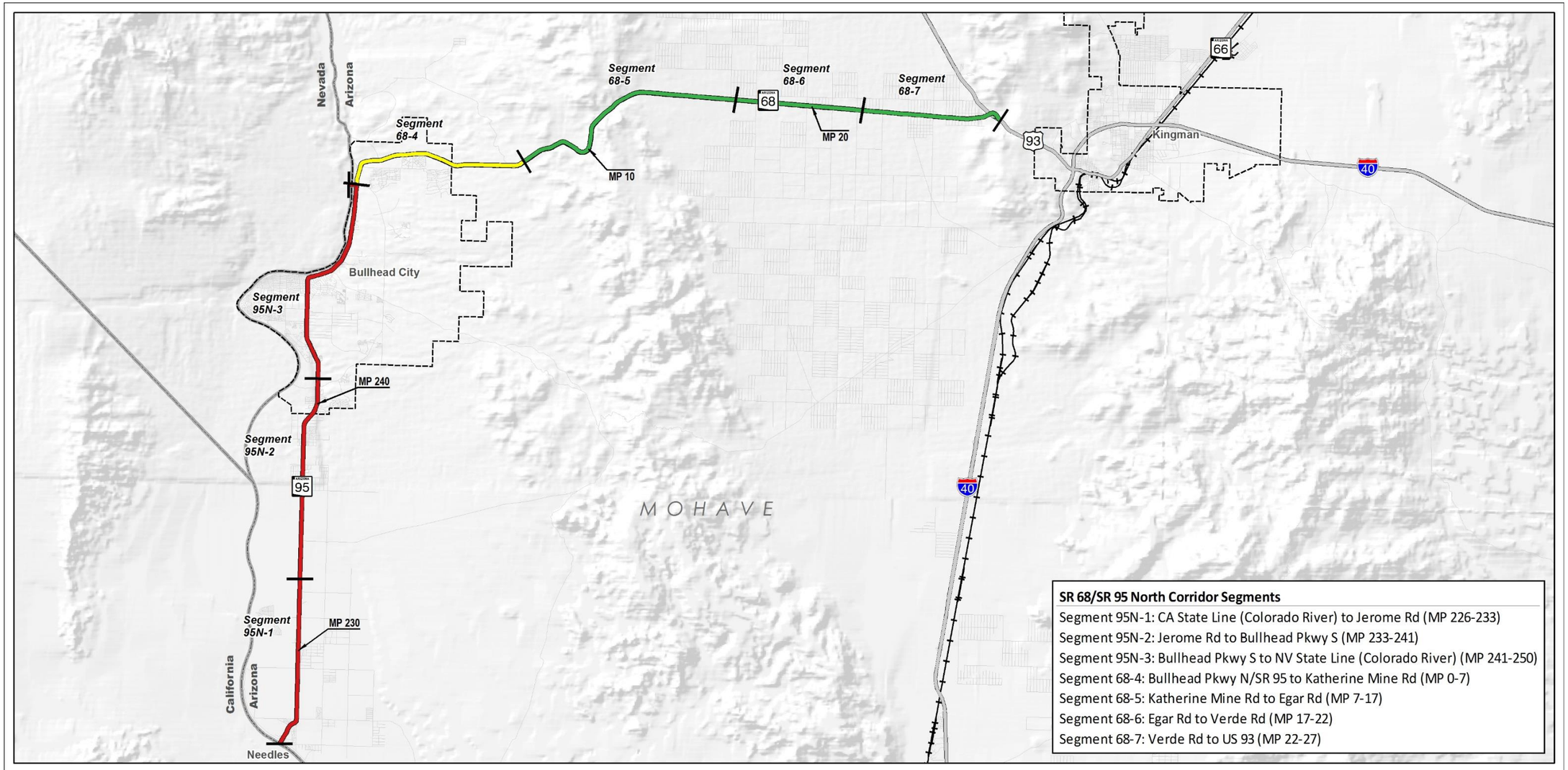
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Average Instances Per Year A
Given Milepost Is Closed Per Segment Mile
2011 - 2015 Data



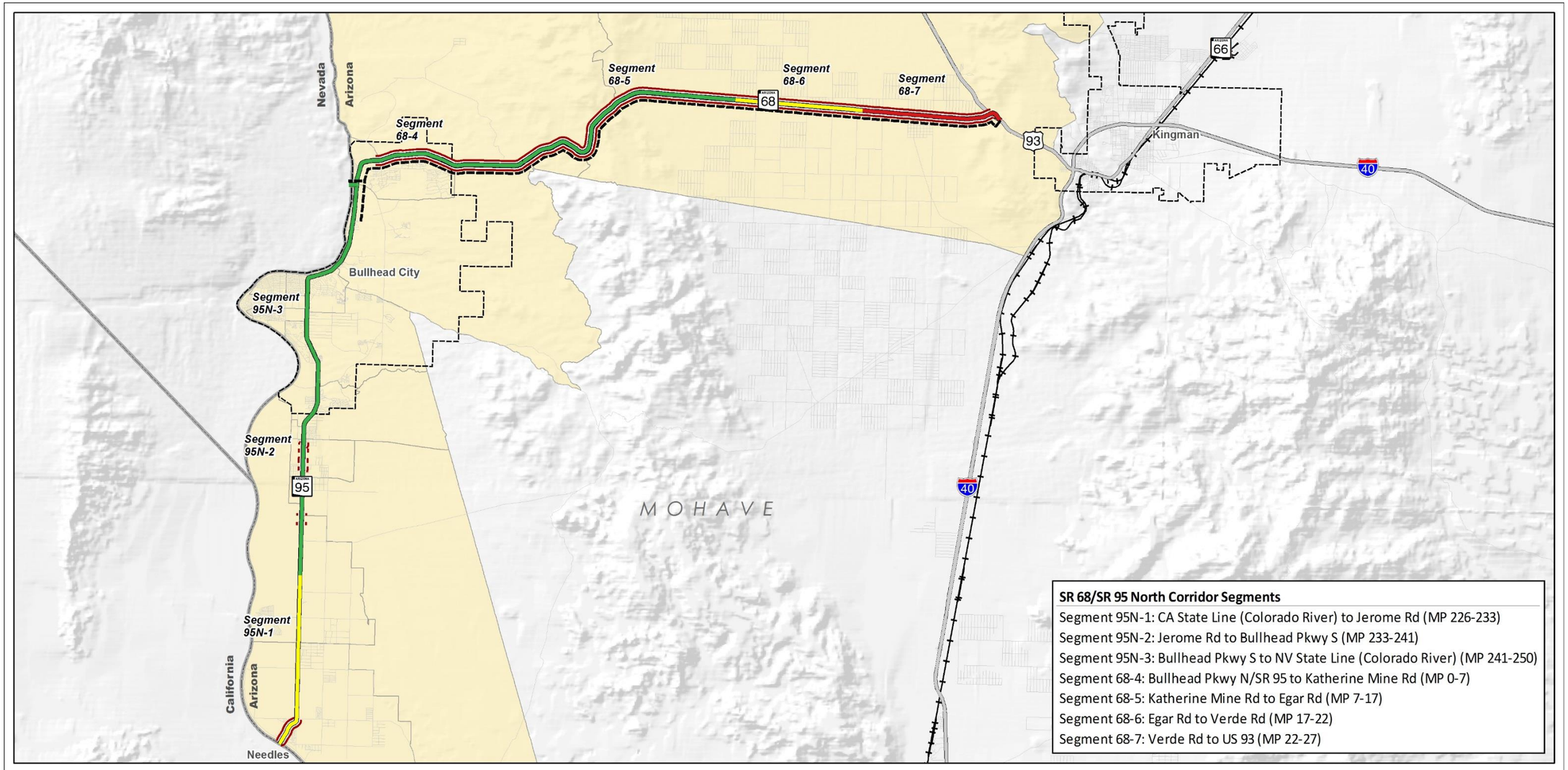
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
All Vehicles Travel Time Index
2015 Data



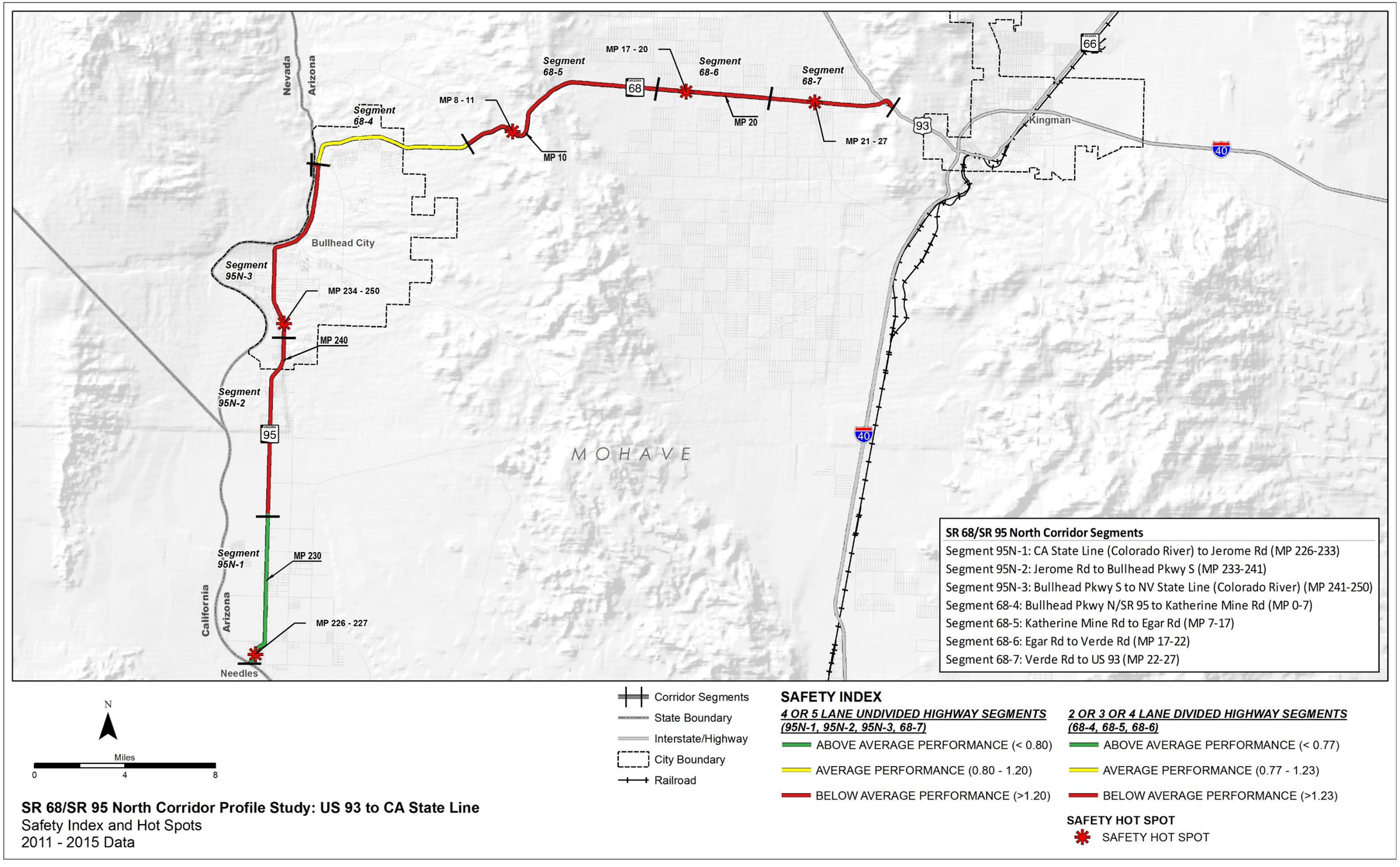
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
All Vehicles Planning Time Index
2015 Data



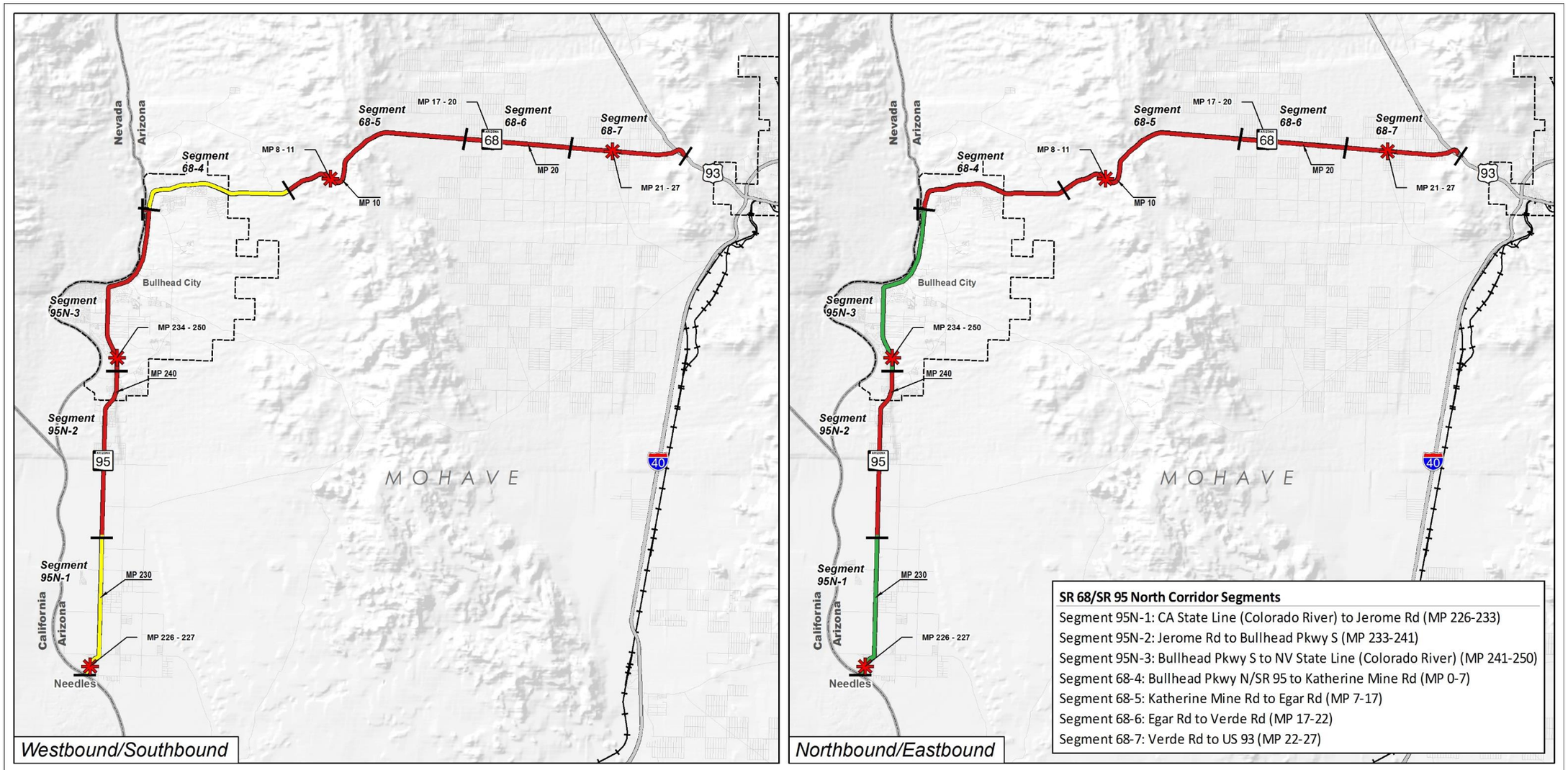
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Percentage of Bicycle Accommodation
2015 Data



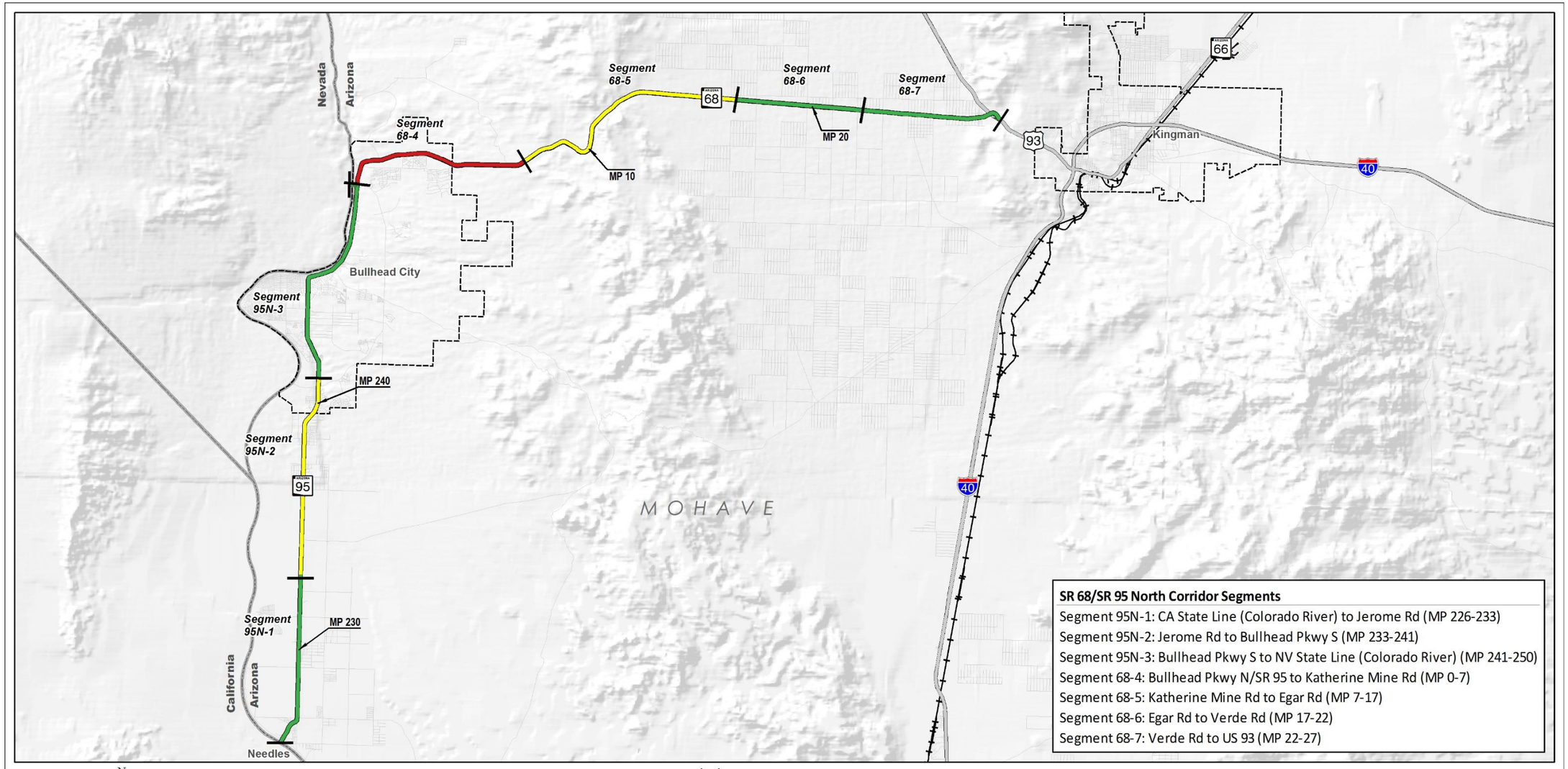
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Multimodal Opportunities
2015 Data



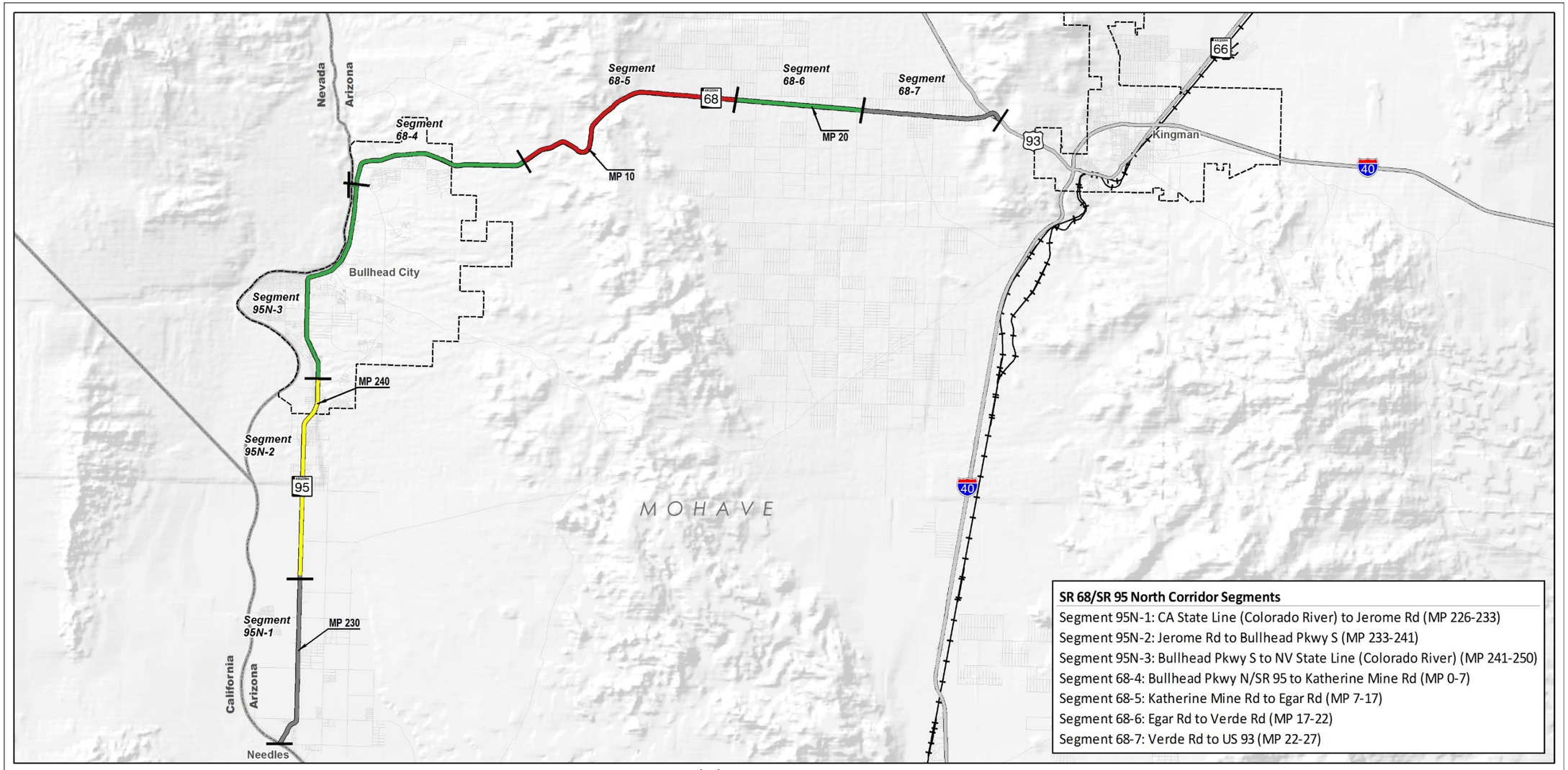
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Safety Index and Hot Spots
2011 - 2015 Data



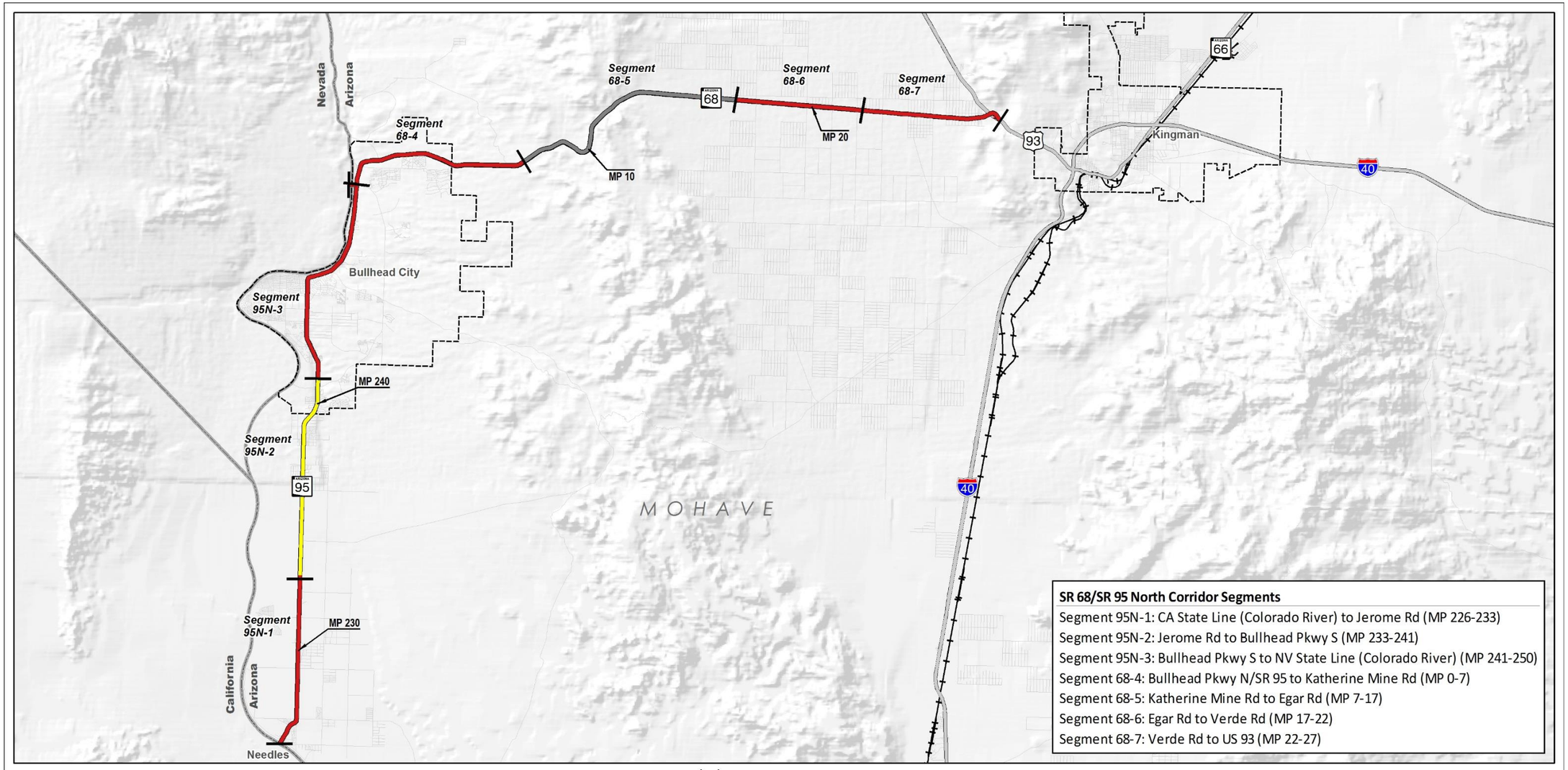
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Directional Safety Index and Hot Spots
2011 - 2015 Data



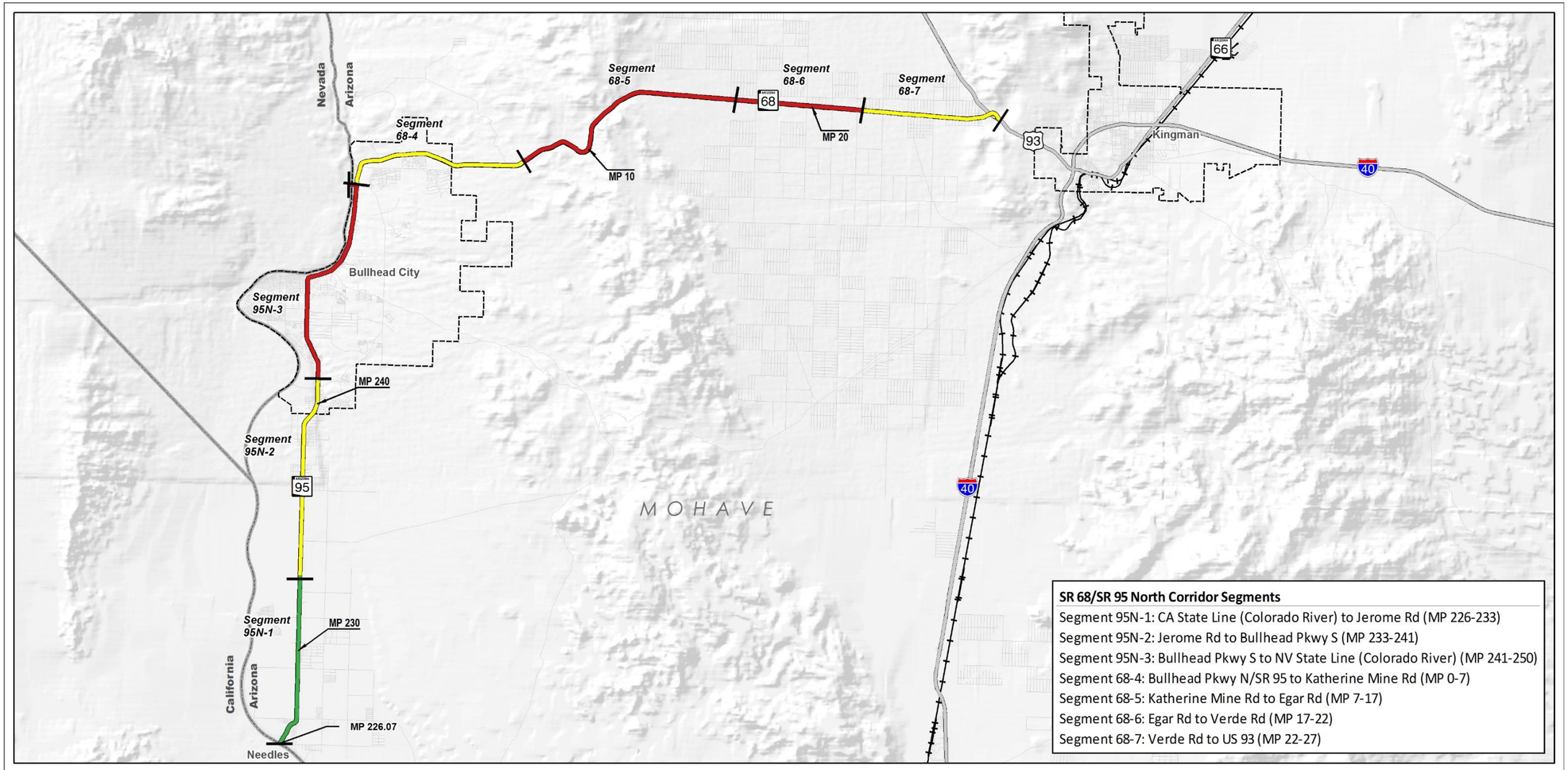
SR 87/SR 260/SR 377 Corridor Profile Study: Loop 202 to I-40
Relative Frequency of Fatal + Incapacitating
Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors
Compared to the Statewide Average for Similar Segments
2011 - 2015 Data



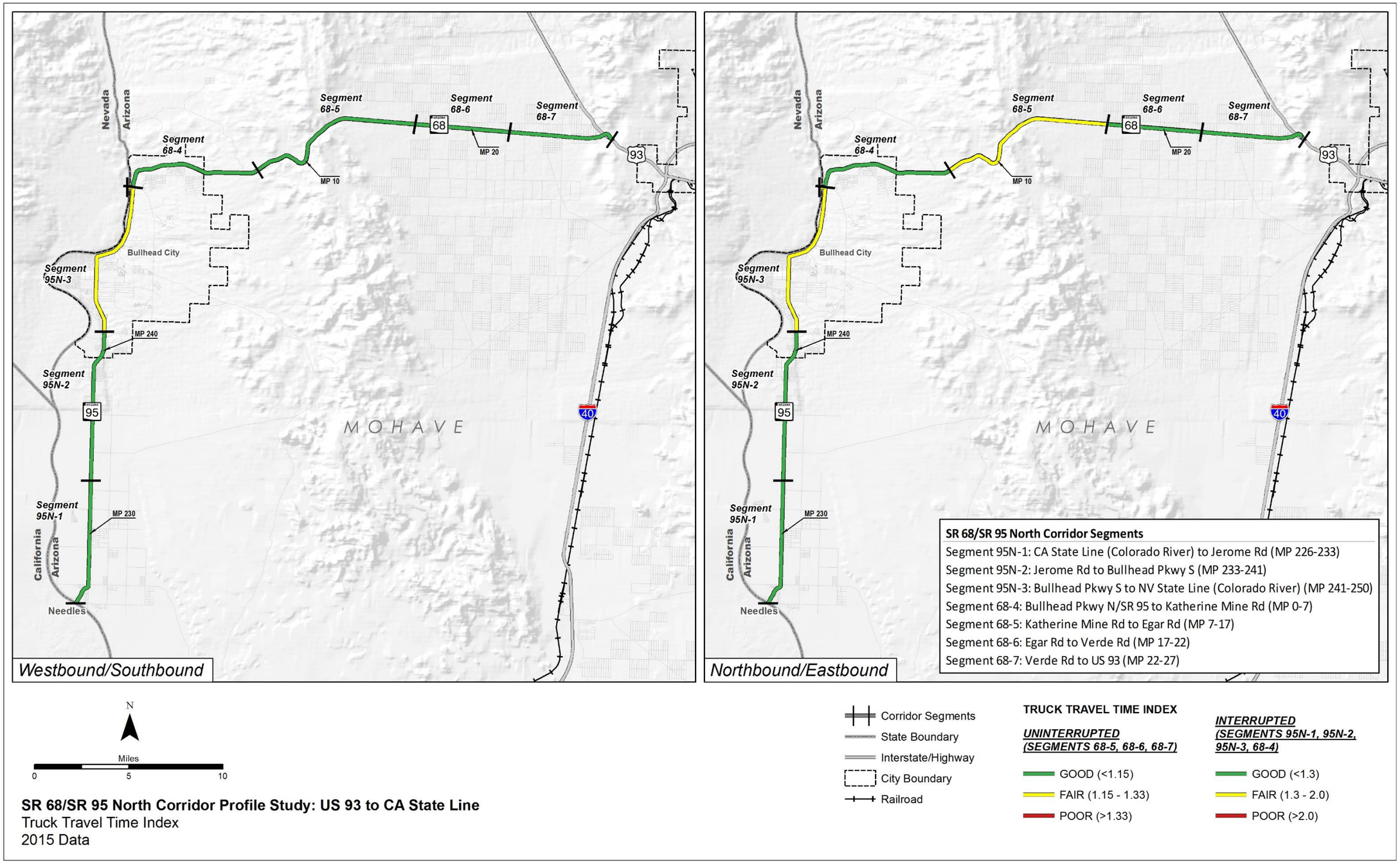
SR 87/SR 260/SR 377 Corridor Profile Study: Loop 202 to I-40
Relative Frequency of Fatal + Incapacitating Injury Crashes Involving Motorcycles Compared to the Statewide Average for Similar Segments
2011 - 2015 Data



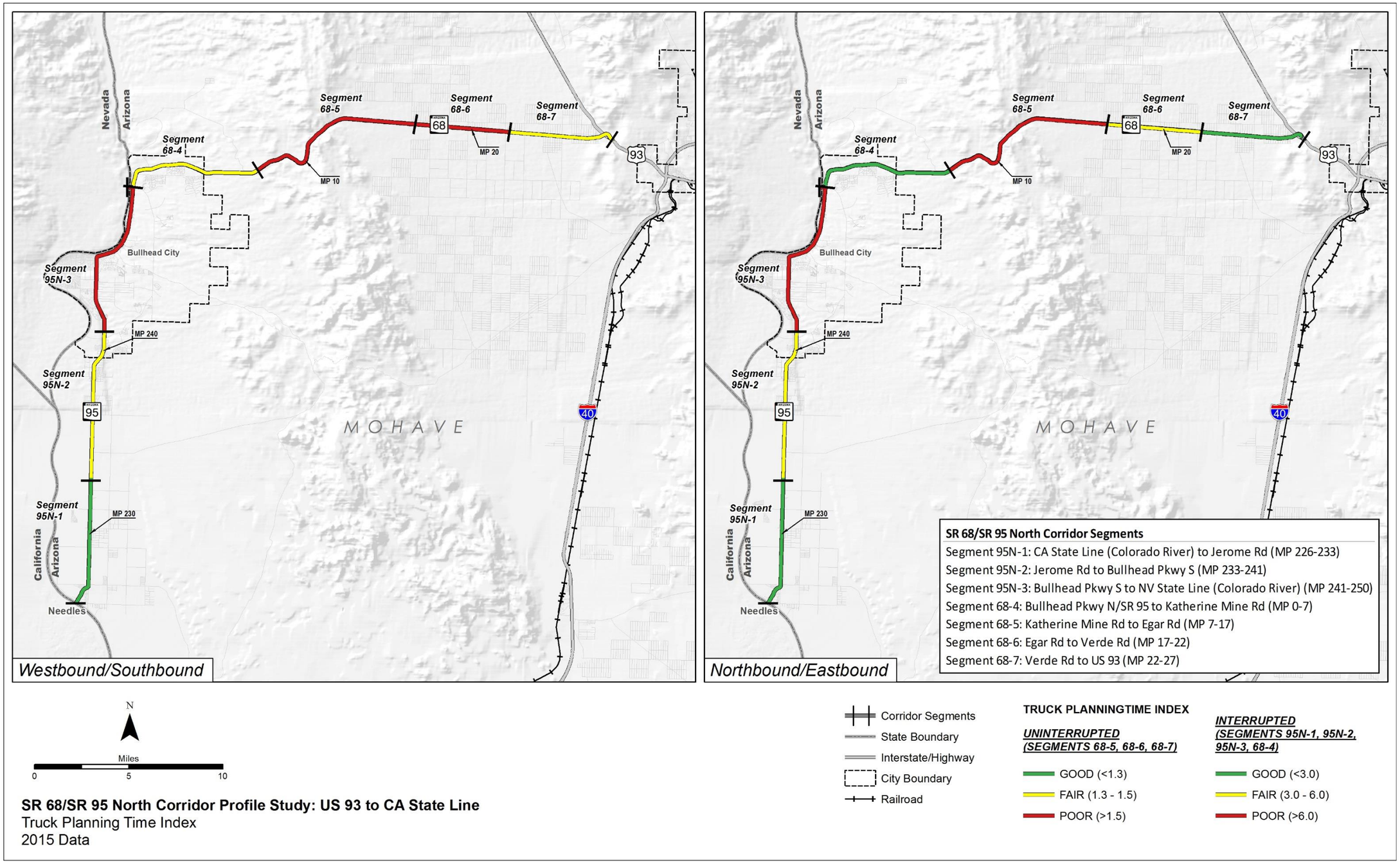
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Relative Frequency of Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers Compared to the Statewide Average for Similar Segments
2011 - 2015 Data



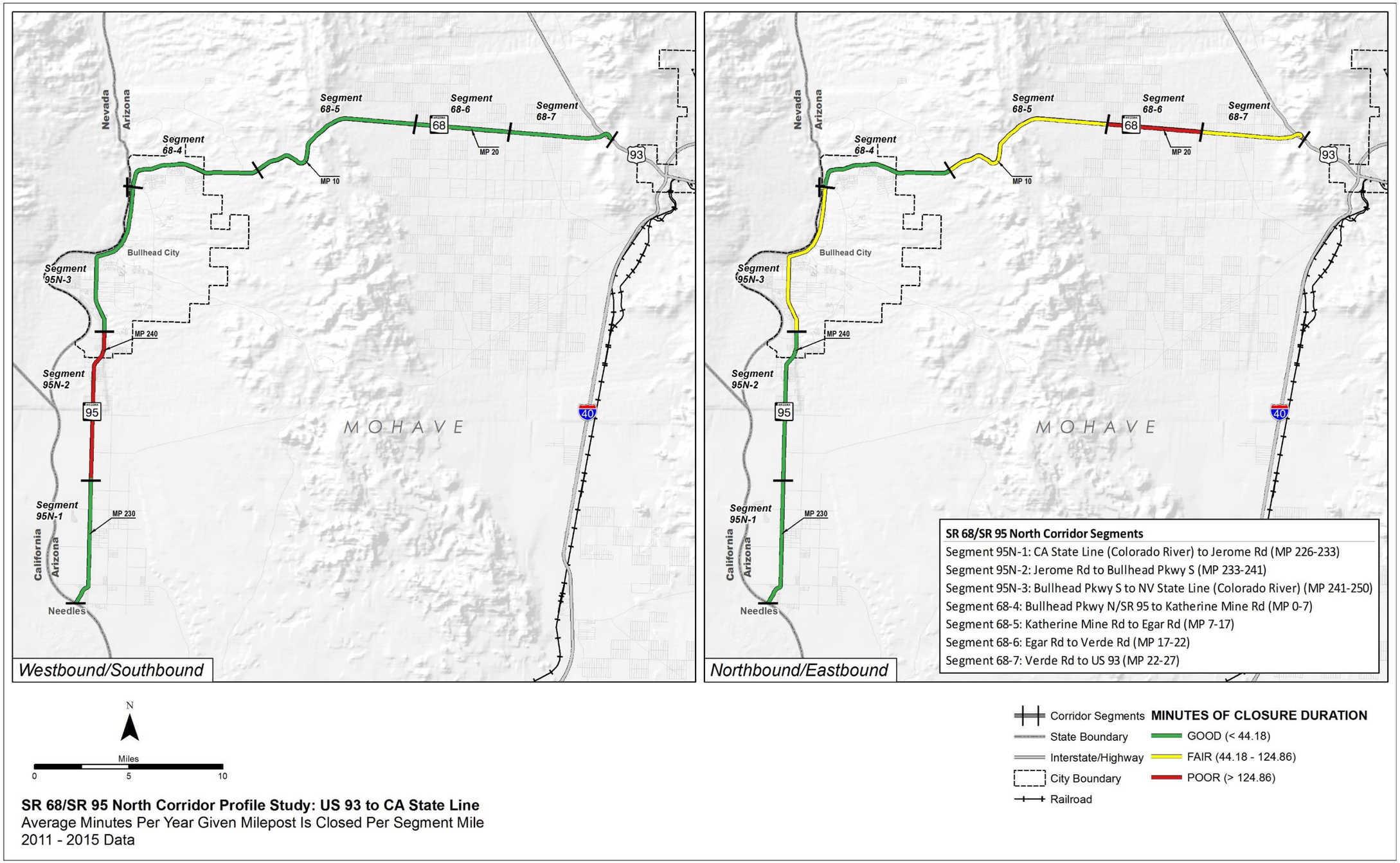
SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Freight Index and Hot Spots
2015 Data



SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Truck Travel Time Index
2015 Data



SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Truck Planning Time Index
2015 Data

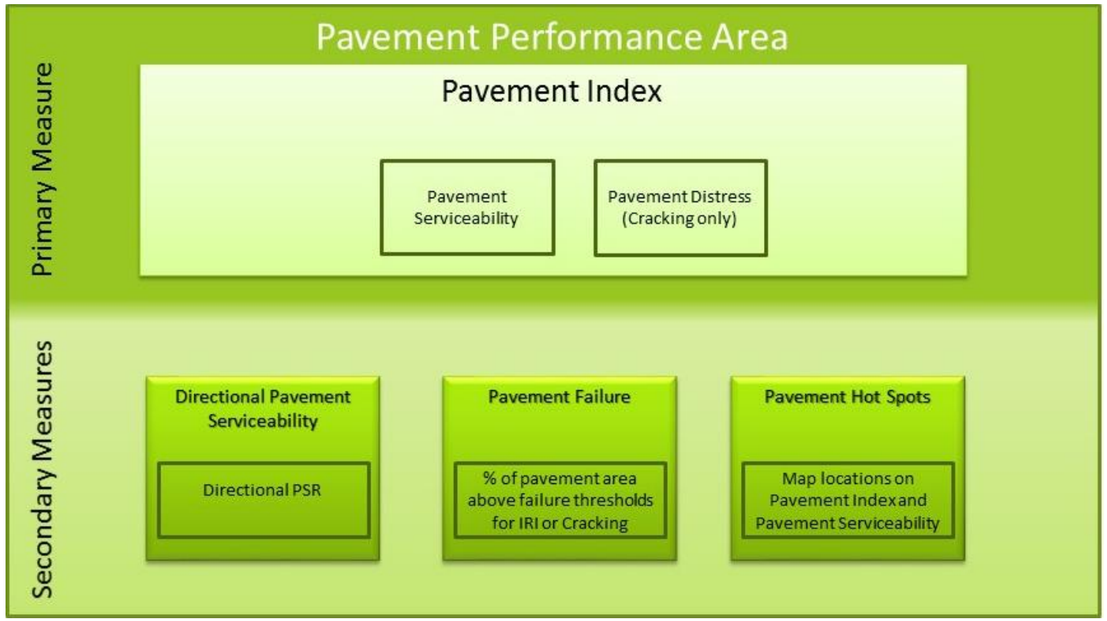


SR 68/SR 95 North Corridor Profile Study: US 93 to CA State Line
Average Minutes Per Year Given Milepost Is Closed Per Segment Mile
2011 - 2015 Data

Appendix B: Performance Area Detailed Calculation Methodologies

Pavement Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Pavement performance area as shown in the following graphic:



This performance area is used to evaluate mainline pavement condition. Pavement condition data for ramps, frontage roads, crossroads, etc. was not included in the evaluation.

Primary Pavement Index

The Pavement Index is calculated based on the use of two pavement condition ratings from the ADOT Pavement Database. The two ratings are the International Roughness Index (IRI) and the Cracking rating. The calculation of the Pavement Index uses a combination of these two ratings.

The IRI is a measurement of the pavement roughness based on field-measured longitudinal roadway profiles. To facilitate the calculation of the index, the IRI rating was converted to a Pavement Serviceability Rating (PSR) using the following equation:

$$PSR = 5 * e^{-0.0038*IRI}$$

The Cracking Rating is a measurement of the amount of surface cracking based on a field-measured area of 1,000 square feet that serves as a sample for each mile. To facilitate the calculation of the index, the Cracking Rating was converted to a Pavement Distress Index (PDI) using the following equation:

$$PDI = 5 - (0.345 * C^{0.66})$$

Both the PSR and PDI use a 0 to 5 scale with 0 representing the lowest performance and 5 representing the highest performance. The performance thresholds for interstates and non-interstates shown in the tables below were used for the PSR and PDI.

Performance Level for Interstates	IRI (PSR)	Cracking (PDI)
Good	<75 (>3.75)	<7 (>3.75)
Fair	75 - 117 (3.20 - 3.75)	7 - 12 (3.22 - 3.75)
Poor	>117 (<3.20)	>12 (<3.22)

Performance Level for Non-Interstates	IRI (PSR)	Cracking (PDI)
Good	<94 (>3.5)	<9 (>3.5)
Fair	94 - 142 (2.9 - 3.5)	9 - 15 (2.9 - 3.5)
Poor	>142 (<2.9)	>15 (<2.9)

The PSR and PDI are calculated for each 1-mile section of roadway. If PSR or PDI falls into a poor rating (<3.2 for interstates, for example) for a 1-mile section, then the score for that 1-mile section is entirely (100%) based on the lower score (either PSR or PDI). If neither PSR or PDI fall into a poor rating for a 1-mile section, then the score for that 1-mile section is based on a combination of the lower rating (70% weight) and the higher rating (30% weight). The result is a score between 0 and 5 for each direction of travel of each mile of roadway based on a combination of both the PSR and the PDI.

The project corridor has been divided into segments. The Pavement Index for each segment is a weighted average of the directional ratings based on the number of travel lanes. Therefore, the condition of a section with more travel lanes will have a greater influence on the resulting segment Pavement Index than a section with fewer travel lanes.

Secondary Pavement Measures

Three secondary measures are evaluated:

- Directional Pavement Serviceability
- Pavement Failure
- Pavement Hot Spots

Directional Pavement Serviceability: Similar to the Pavement Index, the Directional Pavement Serviceability is calculated as a weighted average (based on number of lanes) for each segment. However, this rating only utilizes the PSR and is calculated separately for each direction of travel. The PSR uses a 0 to 5 scale with 0 representing the lowest performance and 5 representing the highest performance.

Pavement Failure: The percentage of pavement area rated above the failure thresholds for IRI or Cracking is calculated for each segment. In addition, the Standard score (z-score) is calculated for each segment.

The Standard score (z-score) is the number of standard deviations above or below the mean. Therefore, a Standard score between -0.5 and +0.5 is “average”, less than -0.5 is lower (better) than average, and higher than +0.5 is above (worse) than average.

Pavement Hot Spots: The Pavement Index map identifies locations that have an IRI rating or Cracking rating that fall above the failure threshold as identified by ADOT Pavement Group. For interstates, an IRI rating above 105 or a Cracking rating above 15 will be used as the thresholds which are slightly different than the ratings shown previously. For non-interstates, an IRI rating above 142 or a Cracking rating above 15 will be used as the thresholds.

Scoring

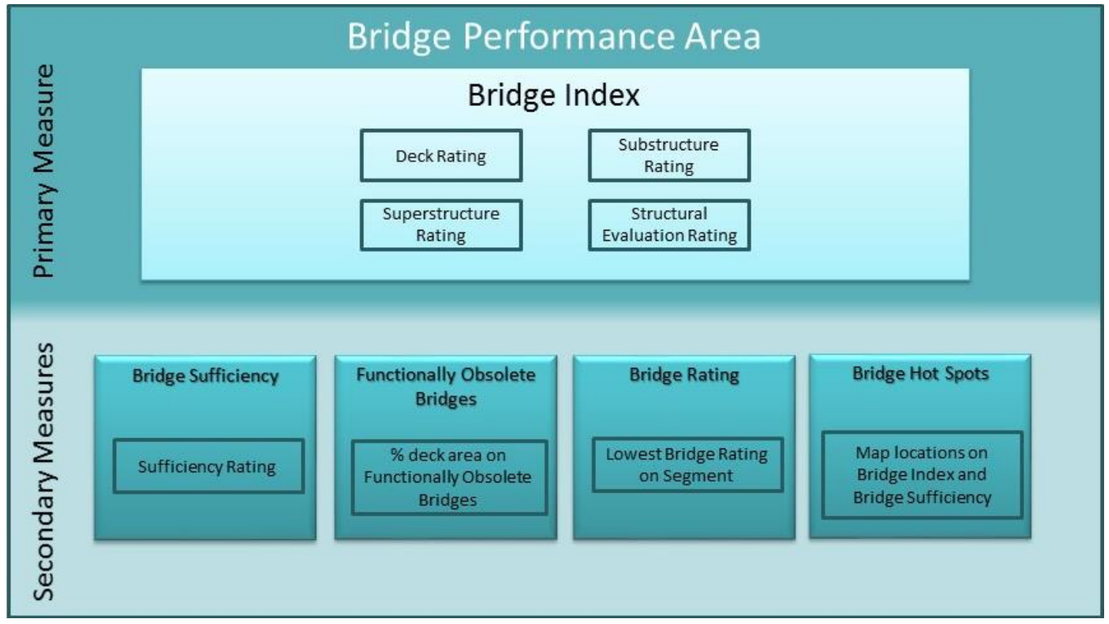
Performance Level	Pavement Index	
	Interstates	Non-Interstates
Good	>3.75	>3.5
Fair	3.2 - 3.75	2.9 - 3.5
Poor	<3.2	<2.9

Performance Level	Directional Pavement Serviceability	
	Interstates	Non-Interstates
Good	>3.75	>3.5
Fair	3.2 - 3.75	2.9 - 3.5
Poor	<3.2	<2.9

Performance Level	% Pavement Failure
Good	< 5%
Fair	5% – 20%
Poor	>20%

Bridge Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Bridge performance area as shown in the following graphic:



This performance area is used to evaluate mainline bridges. Bridges on ramps (that do not cross the mainline), frontage roads, etc. should not be included in the evaluation. Basically, any bridge that carries mainline traffic or carries traffic over the mainline should be included and bridges that do not carry mainline traffic, run parallel to the mainline (frontage roads), or do not cross the mainline should not be included.

Primary Bridge Index

The Bridge Index is calculated based on the use of four bridge condition ratings from the ADOT Bridge Database, also known as the Arizona Bridge Information and Storage System (ABISS). The four ratings are the Deck Rating, Substructure Rating, Superstructure Rating, and Structural Evaluation Rating. The calculation of the Bridge Index uses the lowest of these four ratings.

Each of the four condition ratings use a 0 to 9 scale with 0 representing the lowest performance and 9 representing the highest performance.

The project corridor has been divided into segments and the bridges are grouped together according to the segment definitions. In order to report the Bridge Index for each corridor segment, the Bridge Index for each segment is a weighted average based on the deck area for each bridge. Therefore, the condition of a larger bridge will have a greater influence on the resulting segment Bridge Index than a smaller bridge.

Secondary Bridge Measures

Four secondary measures will be evaluated:

- Bridge Sufficiency
- Functionally Obsolete Bridges
- Bridge Rating
- Bridge Hot Spots

Bridge Sufficiency: Similar to the Bridge Index, the Bridge Sufficiency rating is calculated as a weighted average (based on deck area) for each segment. The Bridge Sufficiency rating is a scale of 0 to 100 with 0 representing the lowest performance and 100 representing the highest performance. A rating of 80 or above represents “good” performance, a rating between 50 and 80 represents “fair” performance, and a rating below 50 represents “poor” performance.

Functionally Obsolete Bridges: The percentage of total deck area in a segment that is on functionally obsolete bridges is calculated for each segment. The deck area for each bridge within each segment that has been identified as functionally obsolete is totaled and divided by the total deck area for the segment to calculate the percentage of deck area on functionally obsolete bridges for each segment.

The thresholds for this performance measure are determined based on the Standard score (z-score). The Standard score (z-score) is the number of standard deviations above or below the mean. Therefore, a Standard score between -0.5 and +0.5 is “average”, less than -0.5 is lower (better) than average, and higher than +0.5 is above (worse) average.

Bridge Rating: The Bridge Rating simply identifies the lowest bridge rating on each segment. This performance measure is not an average and therefore is not weighted based on the deck area. The Bridge Index identifies the lowest rating for each bridge, as described above. Each of the four condition ratings use a 0 to 9 scale with 0 representing the lowest performance and 9 representing the highest performance.

Bridge Hot Spots: The Bridge Index map identifies individual bridge locations that are identified as hot spots. Hot spots are bridges that have a single rating of 4 in any of the four ratings, or multiple ratings of 5 in the deck, substructure or superstructure ratings.

Scoring:

Performance Level	Bridge Index
Good	>6.5
Fair	5.0-6.5
Poor	<5.0

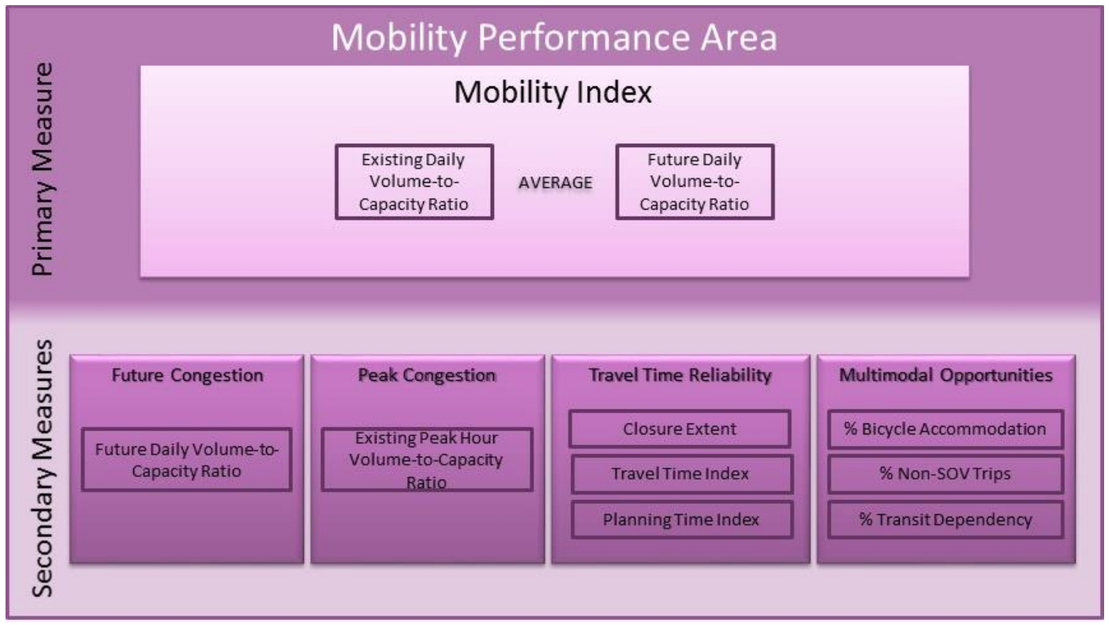
Performance Level	Sufficiency Rating
Good	>80
Fair	50-80
Poor	<50

Performance Level	Bridge Rating
Good	>6
Fair	5-6
Poor	<5

Performance Level	% Functionally Obsolete
Good	< 12%
Fair	12%-40%
Poor	>40%

Mobility Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Mobility performance area as shown in the following graphic:



Primary Mobility Index

The primary Mobility Index is an average of the existing daily volume-to-capacity (V/C) ratio and the future daily V/C ratio for each segment of the corridor.

Existing Daily V/C: The existing daily V/C ratio for each segment is calculated by dividing the 2014 Annual Average Daily Traffic (AADT) volume for each segment by the total Level of Service (LOS) E capacity volume for that segment

The capacity is calculated using the HERS Procedures for Estimating Highway Capacity[1]. The HERS procedure incorporates HCM 2010 methodologies. The methodology includes capacity estimation procedures for multiple facility types including freeways, rural two-lane highways, multilane highways, and signalized and non-signalized urban sections.

The segment capacity is defined as a function of the number of mainline lanes, shoulder width, interrupted or uninterrupted flow facilities, terrain type, percent of truck traffic, and the designated urban or rural environment.

The AADT for each segment is calculated by applying a weighted average across the length of the segment based on the individual 24-hour volumes and distances associated with each HPMS count station within each segment.

The following example equation is used to determine the weighted average of a segment with two HPMS count locations within the corridor

((HPMS 1 Distance x HPMS 1 Volume) + (HPMS 2 Distance x HPMS 2 Volume))/Total Segment Length

For specific details regarding the HERS methodology used, refer to the *Procedures for Estimating Highway Capacity, draft Technical Memorandum.*

Future Daily V/C: The future daily V/C ratio for each segment is calculated by dividing the 2035 AADT volume for each segment by the 2014 LOS E capacity. The capacity volume used in this calculation is the same as is utilized in the existing daily V/C equation.

The future AADT daily volumes are generated by applying an average annual compound growth rate (ACGR) to each 2014 AADT segment volume. The following equation is used to apply the average annual compound growth rate:

2035 AADT = 2014 AADT x ((1+ACGR)^(2035-2014))

The ACGR for each segment is defined by comparing the total volumes in the 2010 Arizona Travel Demand Model (AZTDM2) to the 2035 AZTDM2 traffic volumes at each existing HPMS count station location throughout the corridor. Each 2010 and 2035 segment volume is defined using the same weighted average equation described in the *Existing Daily V/*C section above and then summing the directional volumes for each location. The following equation is used to determine the ACGR for each segment:

ACGR = ((2035 Volume/2010 Volume)^(1/(2035-2010))))-1

Secondary Mobility Measures

Four secondary measures are evaluated:

- Future Congestion
- Peak Congestion
- Travel Time Reliability

[1] HERS Support – 2011, Task 6: Procedures for Estimating Highway Capacity, draft Technical Memorandum. Cambridge Systematics. Prepared for the Federal Highway Administration. March 2013.

  - Closure Extent
  - Directional Travel Time Index
  - Directional Planning Time Index
- Multimodal Opportunities
  - % Bicycle Accommodation
  - % Non-Single Occupancy Vehicle (SOV) Trips
  - % Transit Dependency

Future Congestion: The future daily V/C ratios for each segment in the corridor that are calculated and used in the Mobility Index as part of the overall average between Existing Daily V/C and Future Daily V/C are applied independently as a secondary measure. The methods to calculate the Future Daily V/C can be referenced in the Mobility Index section.

Peak Congestion: Peak Congestion has been defined as the peak hour V/C ratio in both directions of the corridor. The peak hour V/C ratio is calculated using the HERS method as described previously. The peak hour volume utilizes the directional AADT for each segment, which is calculated by applying a weighted average across the length of the segment based on the individual directional 24-hour volumes and distances associated with each HPMS count station within each segment. The segment capacity is defined based on the characteristics of each segment including number of lanes, terrain type, and environment, similar to the 24-hour volumes using the HERS method.

Travel Time Reliability: Travel time reliability is a secondary measure that includes three indicators. The three indicators are the number of times a piece of a corridor is closed for any specific reason, the directional Travel Time Index (TTI), and the directional Planning Time Index (PTI).

Closure Extent: The number of times a roadway is closed is documented through the HCRS dataset. Closure Extent is defined as the average number of times a particular milepost of the corridor is closed per year per mile in a specific direction of travel. The weighted average of each occurrence takes into account the distance over which a specific occurrence spans.

Thresholds that determine levels of good, fair, and poor are based on the average number of closures per mile per year within each of the identified statewide significant corridors by ADOT. The thresholds shown at the end of this section represent statewide averages across those corridors.

Directional Travel Time and Planning Time Index: In terms of overall mobility, the TTI is the relationship of the mean peak period travel time in a specific section of the corridor to the free-flow travel time in the same location. The PTI is the relationship of the 95th percentile highest travel time to the free-flow travel time (based on the posted speed limit) in a specific section of the corridor. The TTI and PTI can be converted into speed-based indices by recognizing that speed is equal to distance traveled divided by travel time. The inverse relationship between travel time and speed means that the 95th percentile highest travel time corresponds to the 5th percentile lowest speed.

Using HERE data provided by ADOT, four time periods for each data point were collected throughout the day (AM peak, mid-day, PM peak, and off-peak). Using the mean speeds and 5th percentile lowest mean speeds collected over 2014 for these time periods for each data location, four TTI and PTI calculations were made using the following formulas:

TTI = Posted Speed Limit/Mean Peak Hour Speed

PTI = Posted Speed Limit/5th Percentile Lowest Speed

The highest value of the four time periods calculation is defined as the TTI for that data point. The average TTI is calculated within each segment based on the number of data points collected. The value of the average TTI across each entry is used as the TTI for each respective segment within the corridor.

Multimodal Opportunities: Three multimodal opportunity indicators reflect the characteristics of the corridor that promote alternate modes to a single occupancy vehicle (SOV) for trips along the corridor. The three indicators include the percent bicycle accommodation, non-SOV trips, and transit dependency along the corridor.

Percent Bicycle Accommodation: For this secondary performance evaluation, outside shoulder widths are evaluated considering the roadway's context and conditions. This requires use of the roadway data that includes right shoulder widths, shoulder surface types, and speed limits, all of which are available in the following ADOT geographic information system (GIS) data sets:

- Right Shoulder Widths
- Left Shoulder Widths (for undivided roadways)
- Shoulder Surface Type (Both Left/Right)
- Speed Limit

Additionally, each segment's average AADT, estimated earlier in the Mobility performance area methodology, is used for the criteria to determine if the existing shoulder width meets the effective width.

The criteria for screening if a shoulder segment meets the recommended width criteria are as followed:

(1) If AADT <= 1500 OR Speed Limit <= 25 miles per hour (mph):
The segment's general purpose lane can be shared with bicyclists (no effective shoulder width required)

(2) If AADT > 1500 AND Speed Limit between (25 - 50 mph) AND Pavement Surface is Paved:
Effective shoulder width required is 4 feet or greater

(3) If AADT > 1500 AND Speed Limit >= 50 mph and Pavement Surface is Paved:
Effective shoulder width required is 6 feet or greater

The summation of the length of the shoulder sections that meet the defined effective width criteria, based on criteria above, is divided by the segment's total length to estimate the percent of the segment that accommodates bicycles as illustrated at the end of this section. If shoulder data is not available or appears erroneous, field measurements can substitute for the shoulder data.

Percent Non-SOV Trips: The percentage of non-SOV trips over distances less than 50 miles gives an indication of travel patterns along a section of the corridor that could benefit from additional multimodal options in the future.

Thresholds that determine levels of good, fair, and poor are based on the percent non-SOV trips within each of the identified statewide significant corridors by ADOT. The thresholds shown at the end of this section represent statewide averages across those corridors.

Percent Transit Dependency: 2008-2012 U.S. Census American Community Survey tract and state level geographic data and attributes from the tables B08201 (Number of Vehicles Available by Household Size) and B17001 (Population in Poverty within the Last 12 Months) were downloaded with margins of error included from the Census data retrieval application Data Ferret. Population ranges for each tract were determined by adding and subtracting the margin of error to each estimate in excel. The tract level attribute data was then joined to geographic tract data in GIS. Only tracts within a one mile buffer of each corridor are considered for this evaluation.

Tracts that have a statistically significantly larger number of either people in poverty or households with only one or no vehicles available than the state average are considered potentially transit dependent.

Example: The state average for zero or one vehicles households (HHs) is between 44.1% and 45.0%. Tracts which have the lower bound of their range above the upper bound of the state range have a greater percentage of zero/one vehicle HHs than the state average. Tracts that have their upper bound beneath the lower bound of the state range have a lesser percentage of zero/one vehicles HHs than the state average. All other tracts that have one of their bounds overlapping with the state average cannot be considered statistically significantly different because there is a chance the value is actually the same.

In addition to transit dependency, the following attributes are added to the Multimodal Opportunities map based on available data.

- Shoulder width throughout the corridor based on 'Shoulder Width' GIS dataset provided by ADOT
- Intercity bus routes
- Multiuse paths within the corridor right-of-way, if applicable

Scoring:

Volume-to-Capacity Ratios		
Urban and Fringe Urban		
Good - LOS A-C	V/C ≤ 0.71	*Note - ADOT Roadway Design Standards indicate Urban and Fringe Urban roadways should be designed to level of service C or better
Fair - LOS D	V/C > 0.71 & ≤ 0.89	
Poor - LOS E or less	V/C > 0.89	
Rural		
Good - LOS A-B	V/C ≤ 0.56	*Note - ADOT Roadway Design Standards indicate Rural roadways should be designed to level of service B or better
Fair - LOS C	V/C > 0.56 & ≤ 0.76	
Poor - LOS D or less	V/C > 0.76	

Performance Level	Closure Extent
Good	≤ 0.22
Fair	> 0.22 & ≤ 0.62
Poor	V/C > 0.62

Performance Level	TTI on Uninterrupted Flow Facilities
Good	< 1.15
Fair	≥ 1.15 & < 1.33
Poor	≥ 1.33

Performance Level	TTI on Interrupted Flow Facilities
Good	< 1.30
Fair	≥ 1.30 & < 1.2.00
Poor	≥ 2.00

Performance Level	PTI on Uninterrupted Flow Facilities
Good	< 1.30
Fair	≥ 1.30 & < 1.50
Poor	≥ 1.50

Performance Level	PTI Interrupted Flow Facilities
Good	< 3.00
Fair	≥ 3.00 & < 6.00
Poor	≥ 6.00

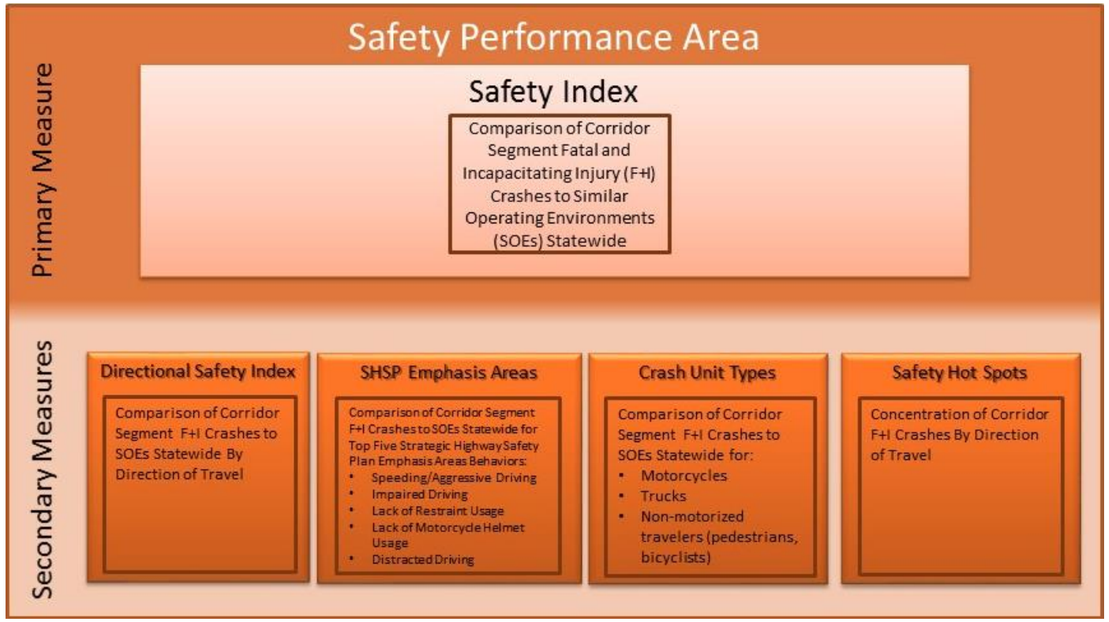
Performance Level	Percent Bicycle Accommodation
Good	≥ 90%
Fair	> 60% & ≤ 90%
Poor	< 60%

Performance Level	Percent Non-SOV Trips
Good	≥ 17%
Fair	> 11% & ≤ 17%
Poor	< 11%

Performance Level	Percent Transit Dependency
Good	Tracts with both zero and one vehicle household population in poverty percentages below the statewide average
Fair	Tracts with either zero and one vehicle household or population in poverty percentages below the statewide average
Poor	Tracts with both zero and one vehicle household and population in poverty percentages above the statewide average

Safety Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Safety performance area as shown in the following graphic:



Primary Safety Index

The Safety Index is a safety performance measure based on the bi-directional (i.e., both directions combined) frequency and rate of fatal and incapacitating injury crashes, the relative cost of those types of crashes, and crash occurrences on similar roadways in Arizona. According to ADOT's 2010 Highway Safety Improvement Program Manual, fatal crashes have an estimated cost that is 14.5 times the estimated cost of incapacitating injury crashes ($5.8 million compared to $400,000).

The Combined Safety Score (CSS) is an interim measure that combines fatal and incapacitating injury crashes into a single value. The CSS is calculated using the following generalized formula:

*CSS = 14.5 * (Normalized Fatal Crash Rate + Frequency) + (Normalized Incapacitating Injury Crash Rate + Frequency)*

Because crashes vary depending on the operating environment of a particular roadway, statewide CSS values were developed for similar operating environments defined by functional classification, urban vs. rural setting, number of travel lanes, and traffic volumes. To determine the Safety Index of a particular segment, the segment CSS is compared to the average statewide CSS for the similar statewide operating environment.

The Safety Index is calculated using the following formula:

Safety Index = Segment CSS / Statewide Similar Operating Environment CSS

The average annual Safety Index for a segment is compared to the statewide similar operating environment annual average, with one standard deviation from the statewide average forming the scale break points.

The more a particular segment's Safety Index value is below the statewide similar operating environment average, the better the safety performance is for that particular segment as a lower value represents fewer crashes.

Scoring:

The scale for rating the Safety Index depends on the operating environments selected, as shown in the table below.

Similar Operating Environment	Safety Index (Overall & Directional)	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	0.94	1.06
2 or 3 or 4 Lane Divided Highway	0.77	1.23
4 or 5 Lane Undivided Highway	0.80	1.20
6 Lane Highway	0.56	1.44
Rural 4 Lane Freeway with Daily Volume < 25,000	0.73	1.27
Rural 4 Lane Freeway with Daily Volume > 25,000	0.68	1.32
Urban 4 Lane Freeway	0.79	1.21
Urban or Rural 6 Lane Freeway	0.82	1.18
Urban > 6 Lane Freeway	0.80	1.20

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

Some corridor segments may have a very low number of total fatal and incapacitating injury crashes. Low crash frequencies (i.e., a small sample size) can translate into performance ratings that can be unstable. In some cases, a change in crash frequency of one crash (one additional crash or one less crash) could result in a change in segment performance of two levels. To avoid reliance on performance ratings where small changes in crash frequency result in large changes in performance, the following two criteria were developed to identify segments with "insufficient data" for assessing performance for the Safety Index. Both of these criteria must be met for a segment to have "insufficient data" to reliably rate the Safety Index performance:

- If the crash sample size (total fatal plus incapacitating injury crashes) for a given segment is less than five crashes over the five-year analysis period; AND

- If a change in one crash results in a change in segment performance by two levels (i.e., a change from below average to above average performance or a change from above average to below average frequency), the segment has "insufficient data" and Safety Index performance ratings are unreliable.

Secondary Safety Measures

The Safety performance area has four secondary measures related to fatal and incapacitating injury crashes:

- Directional Safety Index
- Strategic Highway Safety Plan (SHSP) Behavior Emphasis Areas
- Crash Unit Types
- Safety Hot Spots

Directional Safety Index: The Direction Safety Index shares the same calculation procedure and thresholds as the Safety Index. However, the measure is based on the directional frequency and rate of fatal and incapacitating injury crashes.

Similar to the Safety Index, the segment CSS is compared to the average statewide CSS for the similar statewide operating environment. The Directional Safety Index follows the lead of the Safety Index in terms of "insufficient data" status. If the Safety Index meets both criteria for "insufficient data", the Directional Safety Index should also be changed to "insufficient data". If the Safety Index does not meet both criteria for "insufficient data", the Directional Safety Index would also not change to say "insufficient data"

SHSP Behavior Emphasis Areas: ADOT's 2014 SHSP identifies several emphasis areas for reducing fatal and incapacitating injury crashes. The top five SHSP emphasis areas relate to the following driver behaviors:

- Speeding and aggressive driving
- Impaired driving
- Lack of restraint usage
- Lack of motorcycle helmet usage
- Distracted driving

To develop a performance measure that reflects these five emphasis areas, the percentage of total fatal and incapacitating injury crashes that involves at least one of the emphasis area driver behaviors on a particular segment is compared to the statewide average percentage of crashes involving at least one of the emphasis area driver behaviors on roads with similar operating environments in a process similar to how the Safety Index is developed.

To increase the crash sample size for this performance measure, the five behavior emphasis areas are combined to identify fatal and incapacitating injury crashes that exhibit one or more of the behavior emphasis areas.

The SHSP behavior emphasis areas performance is calculated using the following formula:

% Crashes Involving SHSP Behavior Emphasis Areas = Segment Crashes Involving SHSP Behavior Emphasis Areas / Total Segment Crashes

The percentage of total crashes involving SHSP behavior emphasis areas for a segment is compared to the statewide percentages on roads with similar operating environments. One standard deviation from the statewide average percentage forms the scale break points.

When assessing the performance of the SHSP behavior emphasis areas, the more the frequency of crashes involving SHSP behavior emphasis areas is below the statewide average implies better levels of segment performance. Thus, lower values are better, similar to the Safety Index.

Scoring:

The scale for rating the SHSP behavior emphasis areas performance depends on the crash history on similar statewide operating environments, as shown in the table below:

Similar Operating Environment	Crashes in SHSP Top 5 Emphasis Areas	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	51.2%	57.5%
2 or 3 or 4 Lane Divided Highway	44.4%	54.4%
4 or 5 Lane Undivided Highway	42.4%	51.1%
6 Lane Highway	35.3%	46.5%
Rural 4 Lane Freeway with Daily Volume < 25,000	42.8%	52.9%
Rural 4 Lane Freeway with Daily Volume > 25,000	40.8%	57.1%
Urban 4 Lane Freeway	49.1%	59.4%
Urban or Rural 6 Lane Freeway	33.5%	57.2%
Urban > 6 Lane Freeway	42.6%	54.8%

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

The SHSP behavior emphasis areas secondary safety performance measure for the Safety performance area includes proportions of specific types of crashes within the total fatal and incapacitating injury crash frequencies. This more detailed categorization of fatal and incapacitating injury crashes can result in low crash frequencies (i.e., a small sample size) that translate into performance ratings that can be unstable. In some cases, a change in crash frequency of one crash (one additional crash or one less crash) could result in a change in segment performance of two levels. To avoid reliance on performance ratings where small changes in crash frequency result in large changes in performance, the following criteria were developed to identify segments with "insufficient data" for assessing performance for the SHSP behavior emphasis areas secondary

safety performance measure. If any of these criteria are met for a segment, that segment has "insufficient data" to reliably rate the SHSP behavior emphasis areas performance:

- If the crash sample size (total fatal plus incapacitating injury crashes) for a given segment is less than five crashes over the five-year analysis period, the segment has "insufficient data" and performance ratings are unreliable. OR
- If a change in one crash results in a change in segment performance by two levels (i.e., a change from below average to above average performance or a change from above average to below average frequency), the segment has "insufficient data" and performance ratings are unreliable. OR
- If the corridor average segment crash frequency for the SHSP behavior emphasis areas performance measure is less than two crashes over the five-year analysis period, the entire SHSP behavior emphasis areas performance measure has "insufficient data" and performance ratings are unreliable.

Crash Unit Type Emphasis Areas: ADOT's SHSP also identifies emphasis areas that relate to the following "unit-involved" crashes:

- Heavy vehicle (trucks)-involved crashes
- Motorcycle-involved crashes
- Non-motorized traveler (pedestrians and bicyclists)-involved crashes

To develop a performance measure that reflects the aforementioned crash unit type emphasis areas, the percentage of total fatal and incapacitating injury crashes that involves a given crash unit type emphasis area on a particular segment is compared to the statewide average percentage of crashes involving that same crash unit type emphasis area on roads with similar operating environments in a process similar to how the Safety Index is developed.

The SHSP crash unit type emphasis areas performance is calculated using the following formula:

% Crashes Involving Crash Unit Type = Segment Crashes Involving Crash Unit Type / Total Segment Crashes

The percentage of total crashes involving crash unit types for a segment is compared to the statewide percentages on roads with similar operating environments. One standard deviation from the statewide average percentage forms the scale break points.

When assessing the performance of the crash unit types, the more the frequency of crashes involving crash unit types is below the statewide average implies better levels of segment performance. Thus, lower values are better, similar to the Safety Index. The scale for rating the unit-involved crash performance depends on the crash history on similar statewide operating environments, as shown in the following tables.

Scoring:

Similar Operating Environment	Crashes Involving Trucks	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	5.2%	7.1%
2 or 3 or 4 Lane Divided Highway	3.5%	7.3%
4 or 5 Lane Undivided Highway	6.1%	9.6%
6 Lane Highway	0.3%	8.7%
Rural 4 Lane Freeway with Daily Volume < 25,000	13.2%	17.0%
Rural 4 Lane Freeway with Daily Volume > 25,000	7.2%	12.9%
Urban 4 Lane Freeway	6.8%	10.9%
Urban or Rural 6 Lane Freeway	6.2%	11.0%
Urban > 6 Lane Freeway	2.5%	6.0%

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

Similar Operating Environment	Crashes Involving Motorcycles	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	18.5%	26.5%
2 or 3 or 4 Lane Divided Highway	16.3%	26.3%
4 or 5 Lane Undivided Highway	6.4%	9.4%
6 Lane Highway	0.0%	20.0%
Rural 4 Lane Freeway with Daily Volume < 25,000	5.0%	8.5%
Rural 4 Lane Freeway with Daily Volume > 25,000	7.7%	17.1%
Urban 4 Lane Freeway	9.3%	11.5%
Urban or Rural 6 Lane Freeway	6.7%	12.9%
Urban > 6 Lane Freeway	12.6%	20.5%

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

Similar Operating Environment	Crashes Involving Non-Motorized Travelers	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	2.2%	4.2%
2 or 3 or 4 Lane Divided Highway	2.4%	4.5%
4 or 5 Lane Undivided Highway	4.7%	7.9%
6 Lane Highway	8.4%	17.4%
Rural 4 Lane Freeway with Daily Volume < 25,000	1.7%	2.5%
Rural 4 Lane Freeway with Daily Volume > 25,000	0.0%	0.0%
Urban 4 Lane Freeway	4.8%	10.3%
Urban or Rural 6 Lane Freeway	0.9%	6.7%
Urban > 6 Lane Freeway	0.5%	1.5%

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

The crash unit types have the same “insufficient data” criteria as the SHSP behavior emphasis areas.

Safety Hot Spots: A hot spot analysis was conducted that identified abnormally high concentrations of fatal and incapacitating injury crashes along the study corridor by direction of travel. The identification of crash concentrations involves a GIS-based function known as “kernel density analysis”. This measure is mapped for graphical display purposes with the Directional Safety Index but is not included in the Safety performance area rating calculations.

Freight Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Freight performance area as shown in the following graphic:

Primary Freight Index

The Freight Index is a reliability performance measure based on the planning time index for truck travel. The industry standard definition for the Truck Planning Time Index (TPTI) is the ratio of total travel time needed for 95% on-time arrival to free-flow travel time. The TPTI reflects the extra buffer time needed for on-time delivery while accounting for non-recurring delay. Non-recurring delay refers to unexpected or abnormal delay due to closures or restrictions resulting from circumstances such as crashes, inclement weather, and construction activities.

The TPTI can be converted into a speed-based index by recognizing that speed is equal to distance traveled divided by travel time. The inverse relationship between travel time and speed means that the 95th percentile highest travel time corresponds to the 5th percentile lowest speed. The speed-based TPTI is calculated using the following formula:

TPTI = Free-Flow Truck Speed / Observed 5th Percentile Lowest Truck Speed

Observed 5th percentile lowest truck speeds are available in the 2014 American Digital Cartography, Inc. HERE (formerly NAVTEQ) database to which ADOT has access. The free-flow truck speed is assumed to be 65 miles per hour or the posted speed, whichever is less. This upper limit of 65 mph accounts for governors that trucks often have that restrict truck speeds to no more than 65 mph, even when the speed limit may be higher.

For each corridor segment, the TPTI is calculated for each direction of travel and then averaged to create a bi-directional TPTI. When assessing performance using TPTI, the higher the TPTI value is above 1.0, the more buffer time is needed to ensure on-time delivery.

The Freight Index is calculated using the following formula to invert the overall TPTI:

Freight Index = 1 / Bi-directional TPTI

Inversion of the TPTI allows the Freight Index to have a scale where the higher the value, the better the performance, which is similar to the directionality of the scales of most of the other primary measures. This Freight Index scale is based on inverted versions of TPTI scales created previously by ADOT. The scale for rating the Freight Index differs between uninterrupted and interrupted flow facilities.

Secondary Freight Measures

The Freight performance area includes five secondary measures that provide an in-depth evaluation of the different characteristics of freight performance:

- Recurring Delay (Directional TTTI)
- Non-Recurring Delay (Directional TPTI)
- Closure Duration
- Bridge Vertical Clearance
- Bridge Vertical Clearance Hot Spots

Recurring Delay (Directional TTTI): The performance measure for recurring delay is the Directional Truck Travel Time Index (TTTI). The industry standard definition for TTTI is the ratio of average peak period travel time to free-flow travel time. The TTTI reflects the extra time spent in traffic during peak times due to recurring delay. Recurring delay refers to expected or normal delay due to roadway capacity constraints or traffic control devices.

Similar to the TPTI, the TTTI can be converted into a speed-based index by recognizing that speed is equal to distance traveled divided by travel time. The speed-based TTTI can be calculated using the following formula:

TTTI = Free-Flow Truck Speed / Observed Average Peak Period Truck Speed

Observed average peak period truck speeds are available in the 2014 American Digital Cartography, Inc. HERE (formerly NAVTEQ) database to which ADOT has access. The free-flow truck speed is assumed to be 65 mph or the posted speed, whichever is less.

For each corridor segment, the TTTI is calculated for each direction of travel. With the TTTI, the higher the TTTI value is above 1.0, the more time is spent in traffic during peak times. TTTI values are generally lower than TPTI values. The Directional TTTI scale is based on TTTI scales created previously by ADOT.

Non-Recurring Delay (Directional TPTI): The performance measure for non-recurring delay is the Directional TPTI. Directional TPTI is calculated as described previously as an interim step in the development of the Freight Index.

For each corridor segment, the TPTI is calculated for each direction of travel. With the TPTI, the higher the TPTI value is above 1.0, the more buffer time is needed to ensure on-time delivery.

Closure Duration: This performance measure related to road closures is average roadway closure (i.e., full lane closure) duration time in minutes. There are three main components to full closures that affect reliability – frequency, duration, and extent. In the freight industry, closure duration is the most important component because trucks want to minimize travel time and delay.

Data on the frequency, duration, and extent of full roadway closures on the ADOT State Highway System is available for 2010-2014 in the HCRS database that is managed and updated by ADOT.

The average closure duration in a segment – in terms of the average time a milepost is closed per mile per year on a given segment – is calculated using the following formula:

*Closure Duration = Sum of Segment (Closure Clearance Time * Closure Extent) / Segment Length*

The segment closure duration time in minutes can then be compared to statewide averages for closure duration in minutes, with one-half standard deviation from the average forming the scale break points. The scale for rating closure duration in minutes is found at the end of this section.

Bridge Vertical Clearance: This performance measure uses the vertical clearance information from the ADOT Bridge Database to identify locations with low vertical clearance. The minimum vertical clearance for all underpass structures (i.e., structures under which mainline traffic passes) is determined for each segment.

Bridge Vertical Clearance Hot Spots: This performance measure related to truck restrictions is the locations, or hot spots, where bridge vertical clearance issues restrict truck travel. Sixteen feet three inches (16.25') is the minimum standard vertical clearance value for state highway bridges over travel lanes.

Locations with lower vertical clearance values than the minimum standard are categorized by the ADOT Intermodal Transportation Department Engineering Permits Section as either locations where ramps exist that allow the restriction to be avoided or locations where ramps do not exist and the restriction cannot be avoided. The locations with vertical clearances below the minimum standard that cannot be ramped around are considered hot spots. This measure is mapped for graphical display purposes with the bridge vertical clearance map but is not included in the Freight performance area rating calculations.

Scoring:

Performance Level	Freight Index	
	Uninterrupted Flow Facilities	Interrupted Flow Facilities
Good	> 0.77	> 0.33
Fair	0.67 – 0.77	0.17 – 0.33
Poor	< 0.67	< 0.17

Performance Level	TTTI	
	Uninterrupted Flow Facilities	Interrupted Flow Facilities
Good	< 1.15	< 1.30
Fair	1.15 – 1.33	1.30 – 2.00
Poor	> 1.33	> 2.00

Performance Level	TPTI	
	Uninterrupted Flow Facilities	Interrupted Flow Facilities
Good	< 1.30	< 3.00
Fair	1.30 – 1.50	3.00 – 6.00
Poor	> 1.50	> 6.00

Performance Level	Closure Duration (minutes)
Good	< 44.18
Fair	44.18 – 124.86
Poor	> 124.86

Performance Level	Bridge Vertical Clearance
Good	> 16.5'
Fair	16.0' – 16.5'
Poor	< 16.0'

Appendix C: Performance Area Data

Pavement Performance Area Data

				Direction 1 (Northbound/Eastbound)			Direction 2 (Southbound/Westbound)			Direction 1 (Northbound/Eastbound)		Direction 2 (Southbound/Westbound)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	Dir 1 (N/E)	Dir 2 (S/W)		Dir 1 (N/E)	Dir 2 (S/W)
Segment 1		***Interstate?***	**No**															
Milepost	226	to 227		2	95.61	2.00		0.00	0.10	3.48	4.5	5.00	-	3.77	5.00		0	0
Milepost	227	to 228		4	92.39	4.00		0.00	0.10	3.52	4.1	5.00	-	3.71	5.00		0	0
Milepost	228	to 229		4	84.88	4.00		0.00	0.10	3.62	4.1	5.00	-	3.78	5.00		0	0
Milepost	229	to 230		4	66.68	3.00		0.00	0.10	3.88	4.3	5.00	-	4.00	5.00		0	0
Milepost	230	to 231		4	111.35	0.00		0.00	0.10	3.28	5.0	5.00	-	3.79	5.00		0	0
Milepost	231	to 232		4	125.42	3.00		0.00	0.10	3.10	4.3	5.00	-	3.46	5.00		0	0
Milepost	232	to 233		4	183.98	2.00		0.00	0.10	2.49	4.5	5.00	-	2.49	5.00		4	0
		Total		26			0											4
		Weighted Average								3.33	4.39	#DIV/0!	#DIV/0!	3.55	#DIV/0!			
		Factor								1.00		1.00						
		Indicator Score								**3.33**		**#DIV/0!**						**15.4%**
		Pavement Index														**3.55**		
Segment 2		***Interstate?***	**No**															
Milepost	233	to 234		4	163.46	8.00		0.00	0.10	2.69	3.6	5.00	-	2.69	5.00		4	0
Milepost	234	to 235		4	115.10	3.00		0.00	0.10	3.23	4.3	5.00	-	3.55	5.00		0	0
Milepost	235	to 236		4	100.03	1.00		0.00	0.10	3.42	4.7	5.00	-	3.79	5.00		0	0
Milepost	236	to 237		4	147.96	2.00		0.00	0.10	2.85	4.5	5.00	-	2.85	5.00		4	0
Milepost	237	to 238		4	216.31	5.00		0.00	0.10	2.20	4.0	5.00	-	2.20	5.00		4	0
Milepost	238	to 239		4	132.39	6.00		0.00	0.10	3.02	3.9	5.00	-	3.28	5.00		0	0
Milepost	239	to 240		4	118.46	4.00		0.00	0.10	3.19	4.1	5.00	-	3.47	5.00		0	0
Milepost	240	to 241		4	81.76	2.00		0.00	0.10	3.66	4.5	5.00	-	3.90	5.00		0	0
		Total		32			0											12
		Weighted Average								3.03	4.19	#DIV/0!	#DIV/0!	3.22	#DIV/0!			
		Factor								1.00		1.00						
		Indicator Score								**3.03**		**#DIV/0!**						**37.5%**
		Pavement Index														**3.22**		
Segment 3		***Interstate?***	**No**															
Milepost	241	to 242		4	112.88	2.00		0.00	0.10	3.26	4.5	5.00	-	3.62	5.00		0	0
Milepost	242	to 243		4	116.38	5.00		0.00	0.10	3.21	4.0	5.00	-	3.45	5.00		0	0
Milepost	243	to 244		4	129.63	1.00		0.00	0.10	3.06	4.7	5.00	-	3.54	5.00		0	0
Milepost	244	to 245		4	85.96	3.00		0.00	0.10	3.61	4.3	5.00	-	3.81	5.00		0	0
Milepost	245	to 246		4	76.35	4.00		0.00	0.10	3.74	4.1	5.00	-	3.86	5.00		0	0
Milepost	246	to 247		4	57.60	0.00		0.00	0.10	4.02	5.0	5.00	-	4.31	5.00		0	0
Milepost	247	to 248		4	57.51	0.00		0.00	0.10	4.02	5.0	5.00	-	4.31	5.00		0	0

Milepost	248	to	249	4	230.76	0.00		0.00	0.10	2.08	5.0	5.00	-	2.08	5.00		4	0
Milepost	249	to	250	4	230.76	0.00		0.00	0.10	2.08	5.0	5.00	-	2.08	5.00		4	0
			Total	36			0											8
			Weighted Average							3.23	4.62	#DIV/0!	#DIV/0!	3.45	#DIV/0!			
			Factor							1.00		1.00						
			Indicator Score							**3.23**		**#DIV/0!**						**22.2%**
			Pavement Index													**3.45**		
Segment 4		***Interstate?***		**No**														
Milepost	0	to	1	2	93.10	0.00	2	102.34	2.00	3.51	5.0	3.39	4.5	3.96	3.71		0	0
Milepost	1	to	2	2	65.50	5.00	2	75.30	7.00	3.90	4.0	3.76	3.8	3.93	3.75		0	0
Milepost	2	to	3	2	61.52	3.00	2	66.82	7.00	3.96	4.3	3.88	3.8	4.06	3.79		0	0
Milepost	3	to	4	2	69.16	1.00	2	67.53	0.00	3.84	4.7	3.87	5.0	4.09	4.21		0	0
Milepost	4	to	5	2	67.95	1.00	2	63.42	5.00	3.86	4.7	3.93	4.0	4.10	3.95		0	0
Milepost	5	to	6	2	68.27	1.00	2	67.80	4.00	3.86	4.7	3.86	4.1	4.10	3.95		0	0
Milepost	6	to	7	2	89.75	1.00	2	87.39	2.00	3.56	4.7	3.59	4.5	3.89	3.85		0	0
			Total	14			14											0
			Weighted Average							3.78	4.56	3.75	4.22	4.02	3.89			
			Factor							1.00		1.00						
			Indicator Score							**3.78**		**3.75**						**0.0%**
			Pavement Index													**3.95**		
Segment 5		***Interstate?***		**No**														
Milepost	7	to	8	2	80.02	1.00	2	75.31	3.00	3.69	4.7	3.76	4.3	3.98	3.92		0	0
Milepost	8	to	9	2	80.83	2.00	2	94.93	1.00	3.68	4.5	3.49	4.7	3.91	3.84		0	0
Milepost	9	to	10	2	75.05	3.00	2	118.27	10.00	3.76	4.3	3.19	3.4	3.92	3.26		0	0
Milepost	10	to	11	2	86.71	1.00	2	119.88	10.00	3.60	4.7	3.17	3.4	3.91	3.25		0	0
Milepost	11	to	12	2	80.56	8.00	2	99.40	1.00	3.68	3.6	3.43	4.7	3.65	3.80		0	0
Milepost	12	to	13	2	83.67	2.00	2	97.45	12.00	3.64	4.5	3.45	3.2	3.88	3.29		0	0
Milepost	13	to	14	2	85.49	1.00	2	86.73	9.00	3.61	4.7	3.60	3.5	3.93	3.55		0	0
Milepost	14	to	15	2	94.88	5.00	2	96.37	3.00	3.49	4.0	3.47	4.3	3.64	3.71		0	0
Milepost	15	to	16	2	96.55	2.00	2	95.49	3.00	3.46	4.5	3.48	4.3	3.76	3.72		0	0
Milepost	16	to	17	2	90.85	2.00	2	93.74	2.00	3.54	4.5	3.50	4.5	3.81	3.79		0	0
			Total	20			20											0
			Weighted Average							3.61	4.37	3.45	4.02	3.84	3.61			
			Factor							1.00		1.00						
			Indicator Score							**3.61**		**3.45**						**0.0%**
			Pavement Index													**3.73**		
Segment 6		***Interstate?***		**No**														
Milepost	17	to	18	2	112.25	3.00	2	112.35	9.00	3.26	4.3	3.26	3.5	3.57	3.34		0	0
Milepost	18	to	19	2	108.17	1.00	2	90.55	6.00	3.31	4.7	3.54	3.9	3.72	3.64		0	0
Milepost	19	to	20	2	109.90	1.00	2	110.22	3.00	3.29	4.7	3.29	4.3	3.70	3.59		0	0
Milepost	20	to	21	2	91.89	1.00	2	125.37	1.00	3.53	4.7	3.11	4.7	3.86	3.57		0	0

Milepost	21	to	22	2	103.76	3.00	2	125.37	1.00	3.37	4.3	3.11	4.7	3.65	3.57		0	0
			Total	10			10											0
			Weighted Average							3.35	4.51	3.26	4.20	3.70	3.54			
			Factor							1.00		1.00						
			Indicator Score							**3.35**		**3.26**						**0.0%**
			Pavement Index													**3.62**		
Segment 7		***Interstate?***		**No**														
Milepost	22	to	23	4	121.38	5.00		0.00	0.10	3.15	4.0	5.00	-	3.41	5.00		0	0
Milepost	23	to	24	4	127.76	1.00		0.00	0.10	3.08	4.7	5.00	-	3.55	5.00		0	0
Milepost	24	to	25	4	101.38	3.00		0.00	0.10	3.40	4.3	5.00	-	3.67	5.00		0	0
Milepost	25	to	26	4	52.40	0.00		0.00	0.10	4.10	5.0	5.00	-	4.37	5.00		0	0
Milepost	26	to	27	4	70.43	0.00		0.00	0.10	3.83	5.0	5.00	-	4.18	5.00		0	0
			Total	20			0											0
			Weighted Average							3.51	4.59	#DIV/0!	#DIV/0!	3.83	#DIV/0!			
			Factor							1.00		1.00						
			Indicator Score							**3.51**		**#DIV/0!**						**0.0%**
			Pavement Index													**3.83**		

Bridge Performance Area Data

Structure Name (A209)	Structure # (N8)	Milepost (A232)	Area (A225)	Bridge Sufficiency	Bridge Index					Functionally Obsolete Bridges	Bridge Rating	Hot Spots on Bridge Index map
				Sufficiency Rating	Deck (N58)	Sub (N59)	Super (N60)	Eval (N67)	Lowest	Deck Area on Func Obsolete		
Segment 1												
Needles Bridge	02435	226.07	27621	80.90	4.00	8.00	7.00	7.00	4.0	0		
Total			27,621									
Weighted Average				80.90					4.00	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**80.90**						**0.00%**	**4**	
Bridge Index									**4.00**			
Segment 2												
N/A - No Bridges in Segment	-	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		
Total			#N/A									
Weighted Average				#N/A					#N/A	#N/A		
Factor				1.00					1.00	1.00		
Indicator Score				**#N/A**						**#N/A**	**#N/A**	
Bridge Index									**#N/A**			
Segment 3												
Laughlin Br-Colo Rvr	02539	250.00	42929	49.80	7.00	7.00	7.00	5.00	5.0	42,929		
Total			42,929									
Weighted Average				49.80					5.00	100.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**49.80**						**100.00%**	**5**	
Bridge Index									**5.00**			
Segment 4												
Arabian Wash Bridge	02009	1.36	4201	87.50	6.00	7.00	7.00	7.00	6.0	0		
Total			4,201									
Weighted Average				87.50					6.00	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**87.50**						**0.00%**	**6**	
Bridge Index									**6.00**			
Segment 5												
Arabian Wash Bridge EB	02273	7.50	12410	99.70	6.00	8.00	7.00	7.00	6.0	0		
Arabian Wash Bridge WB	02274	7.60	12410	99.70	6.00	7.00	7.00	7.00	6.0	0		
Wildlife Crossing Br EB	02278	10.76	5779	99.70	6.00	8.00	7.00	7.00	6.0	0		
Wildlife Crossing Br WB	02619	10.76	5779	99.70	7.00	8.00	7.00	7.00	7.0	0		

Wildlife Crossing Br	02654	11.95	12600	80.00	7.00	8.00	7.00	7.00	7.0	0		
Total			48,978									
Weighted Average				94.63					6.38	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**94.63**						**0.00%**	**6**	
Bridge Index									**6.38**			
Segment 6												
Sacramento Wash Br WB	02272	18.11	56640	99.60	6.00	6.00	7.00	6.00	6.0	0		
Sacramento Wash Br EB	02271	18.12	56640	99.60	6.00	6.00	7.00	6.00	6.0	0		
Twin Wash Br EB	02275	20.27	28603	99.60	7.00	7.00	7.00	7.00	7.0	0		
Twin Wash Br WB	02276	20.27	28603	99.60	7.00	7.00	7.00	7.00	7.0	0		
Cerbat Wash Br EB	02191	21.23	5145	99.60	6.00	6.00	7.00	6.00	6.0	0		
Cerbat Wash Br WB	02277	21.23	5145	99.60	6.00	6.00	7.00	6.00	6.0	0		
Total			180,776									
Weighted Average				99.60					6.32	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**99.60**						**0.00%**	**6**	
Bridge Index									**6.32**			
Segment 7												
13 Mile Wash Bridge	02192	23.17	11685	98.20	6.00	6.00	7.00	6.00	6.0	0		
Total			11,685									
Weighted Average				98.20					6.00	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				**98.20**						**0.00%**	**6**	
Bridge Index									**6.00**			

Mobility Performance Area Data

Segment	Begin MP	End MP	Length (mi)	Facility Type	Flow Type	Terrain	No. of Lanes	Capacity Environment Type	Lane Width (feet)	EB/NB Right Shoulder Width	WB/SB Right Shoulder Width	EB/NB Left Shoulder Width	WB/SB Left Shoulder Width	NB/EB AADT	SB/WB AADT	2015 AADT	K Factor	D Factor	T Factor	Weighted Average Posted Speed	Divided or Undivided	Access Points (per mile)	% No-Passing Zone	Street Parking
95N-1	226	233	7	Rural	Interrupted	Level	3.65	Urban/Rural Single or Multilane Signalized	12.00	3.96	2.68	N/A	N/A	6104	6152	12256	11%	51%	16%	50	Undivided	N/A	100%	N/A
95N-2	233	241	8	Fringe Urban	Interrupted	Level	4	Urban/Rural Single or Multilane Signalized	12.00	1.54	1.66	N/A	N/A	11312	11359	22671	10%	52%	13%	56	Undivided	N/A	0%	N/A
95N-3	241	250	9	Fringe Urban	Interrupted	Level	4	Urban/Rural Single or Multilane Signalized	12.00	0.02	0.02	N/A	N/A	14029	13718	27747	9%	52%	6%	45	Undivided	N/A	0%	N/A
68-4	0	7	7	Rural	Interrupted	Mountainous	4	Urban/Rural Single or Multilane Signalized	12.00	8.53	9.28	N/A	N/A	4652	4698	9351	9%	50%	14%	59	Divided	N/A	0%	N/A
68-5	7	17	10	Rural	Uninterrupted	Mountainous	4	Multilane Highway	12.00	9.48	9.48	9.48	2.84	3873	3907	7782	10%	50%	20%	65	Divided	1	0%	N/A
68-6	17	22	5	Fringe Urban	Uninterrupted	Level	4	Multilane Highway	12.00	9.35	9.58	9.58	3.93	4546	4483	9028	10%	50%	22%	65	Divided	3	0%	N/A
68-7	22	27	5	Fringe Urban	Uninterrupted	Level	4	Multilane Highway	12.00	10.00	9.78	9.78	N/A	6548	4920	11468	8%	57%	20%	55	Undivided	13	0%	Street Parking Prohibited

Car TTI and PTI/Truck TTTI and TPTI – Northbound/Eastbound

Segment	TMC	timeperiod	week_type	ROAD_NUMBER	road_direction	cars_mean	trucks_mean	cars_P05	trucks_P05	Posted Speed limit	Assumed car free-flow speed	Assumed truck free-flow speed	cars_TTI	Trucks_TTI	cars_PTI	Trucks_PTI	Cars_PeakTTI	Trucks_PeakTTI	Cars_PeakPTI	Trucks_PeakPTI
1	115P07231	1 AM Peak	Weekday	AZ-95	Northbound	34.877	31.334	18.6161	14.931	35	35	35	1.00	1.12	1.88	2.34	1.06	1.12	2.21	2.34
1	115P07231	2 Mid Day	Weekday	AZ-95	Northbound	33.171	32.3836	16.7617	20.3479	35	35	35	1.06	1.08	2.09	1.72				
1	115P07231	3 PM Peak	Weekday	AZ-95	Northbound	33.938	32.3592	16.7617	19.8854	35	35	35	1.03	1.08	2.09	1.76				
1	115P07231	4 Evening	Weekday	AZ-95	Northbound	34.078	32.3424	15.8507	23.6475	35	35	35	1.03	1.08	2.21	1.48				
1	115P06460	1 AM Peak	Weekday	AZ-95	Northbound	48.447	46.8577	33.5632	25.4944	49	49	49	1.01	1.05	1.46	1.92	1.03	1.05	1.57	1.97
1	115P06460	2 Mid Day	Weekday	AZ-95	Northbound	47.607	46.6533	31.9892	24.8665	49	49	49	1.03	1.05	1.53	1.97				
1	115P06460	3 PM Peak	Weekday	AZ-95	Northbound	48.885	47.9177	31.5889	32.4415	49	49	49	1.00	1.02	1.55	1.51				
1	115P06460	4 Evening	Weekday	AZ-95	Northbound	49.582	47.9271	31.1599	35.4487	49	49	49	1.00	1.02	1.57	1.38				
2	115P06460	1 AM Peak	Weekday	AZ-95	Northbound	48.447	46.8577	33.5632	25.4944	49	49	49	1.01	1.05	1.46	1.92	1.03	1.05	1.57	1.97
2	115P06460	2 Mid Day	Weekday	AZ-95	Northbound	47.607	46.6533	31.9892	24.8665	49	49	49	1.03	1.05	1.53	1.97				
2	115P06460	3 PM Peak	Weekday	AZ-95	Northbound	48.885	47.9177	31.5889	32.4415	49	49	49	1.00	1.02	1.55	1.51				
2	115P06460	4 Evening	Weekday	AZ-95	Northbound	49.582	47.9271	31.1599	35.4487	49	49	49	1.00	1.02	1.57	1.38				
2	115P06461	1 AM Peak	Weekday	AZ-95	Northbound	46.581	46.1829	22.3816	29.1776	53	53	53	1.14	1.15	2.37	1.82	1.16	1.17	2.85	2.18
2	115P06461	2 Mid Day	Weekday	AZ-95	Northbound	45.538	45.2062	21.449	24.2656	53	53	53	1.16	1.17	2.47	2.18				
2	115P06461	3 PM Peak	Weekday	AZ-95	Northbound	46.277	45.5831	18.6224	25.466	53	53	53	1.15	1.16	2.85	2.08				
2	115P06461	4 Evening	Weekday	AZ-95	Northbound	49.644	48.1727	27.9336	37.7323	53	53	53	1.07	1.10	1.90	1.40				
2	115P06462	1 AM Peak	Weekday	AZ-95	Northbound	36.052	32.3308	12.4442	6.8353	45	45	45	1.25	1.39	3.62	6.58	1.35	1.46	4.67	6.58
2	115P06462	2 Mid Day	Weekday	AZ-95	Northbound	33.238	30.8674	10.5725	6.8353	45	45	45	1.35	1.46	4.26	6.58				
2	115P06462	3 PM Peak	Weekday	AZ-95	Northbound	34.031	33.3738	9.6327	9.6327	45	45	45	1.32	1.35	4.67	4.67				
2	115P06462	4 Evening	Weekday	AZ-95	Northbound	38.974	37.8923	13.0368	13.0368	45	45	45	1.15	1.19	3.45	3.45				
2	115P06463	1 AM Peak	Weekday	AZ-95	Northbound	40.304	36.2542	19.4144	16.7711	45	45	45	1.12	1.24	2.32	2.68	1.20	1.32	2.90	4.26
2	115P06463	2 Mid Day	Weekday	AZ-95	Northbound	37.428	34.0224	16.7711	12.4252	45	45	45	1.20	1.32	2.68	3.62				
2	115P06463	3 PM Peak	Weekday	AZ-95	Northbound	38.522	33.9984	15.8414	10.5688	45	45	45	1.17	1.32	2.84	4.26				
2	115P06463	4 Evening	Weekday	AZ-95	Northbound	40.301	37.1454	15.5315	16.7711	45	45	45	1.12	1.21	2.90	2.68				
2	115P06464	1 AM Peak	Weekday	AZ-95	Northbound	37.144	35.0626	11.8168	11.8168	45	45	45	1.21	1.28	3.81	3.81	1.35	1.49	5.17	6.58
2	115P06464	2 Mid Day	Weekday	AZ-95	Northbound	33.375	30.1367	10.1113	6.8428	45	45	45	1.35	1.49	4.45	6.58				
2	115P06464	3 PM Peak	Weekday	AZ-95	Northbound	33.346	31.4028	8.7053	7.6625	45	45	45	1.35	1.43	5.17	5.87				
2	115P06464	4 Evening	Weekday	AZ-95	Northbound	39.542	37.0556	13.0773	13.6855	45	45	45	1.14	1.21	3.44	3.29				
3	115P05933	1 AM Peak	Weekday	AZ-95	Northbound	37.359	31.108	11.8038	6.8354	45	45	45	1.20	1.45	3.81	6.58	1.33	1.51	6.04	6.58
3	115P05933	2 Mid Day	Weekday	AZ-95	Northbound	33.927	29.7652	12.4292	6.8354	45	45	45	1.33	1.51	3.62	6.58				
3	115P05933	3 PM Peak	Weekday	AZ-95	Northbound	34.211	29.9383	11.2866	7.4561	45	45	45	1.32	1.50	3.99	6.04				
3	115P05933	4 Evening	Weekday	AZ-95	Northbound	37.34	34.6953	7.4561	6.8354	45	45	45	1.21	1.30	6.04	6.58				
3	115P06465	1 AM Peak	Weekday	AZ-95	Northbound	41.928	37.8909	20.4918	15.5214	45	45	45	1.07	1.19	2.20	2.90	1.24	1.33	3.23	4.53
3	115P06465	2 Mid Day	Weekday	AZ-95	Northbound	36.345	33.9403	13.9219	9.9388	45	45	45	1.24	1.33	3.23	4.53				
3	115P06465	3 PM Peak	Weekday	AZ-95	Northbound	37.389	35.2851	13.9752	10.1461	45	45	45	1.20	1.28	3.22	4.44				
3	115P06465	4 Evening	Weekday	AZ-95	Northbound	42.2	39.448	18.4219	18.8503	45	45	45	1.07	1.14	2.44	2.39				

3	115P06466	1 AM Peak	Weekday	AZ-95	Northbound	37.541	34.8865	9.9248	14.8872	45	45	45	1.20	1.29	4.53	3.02	1.35	1.43	6.03	6.30
3	115P06466	2 Mid Day	Weekday	AZ-95	Northbound	33.348	32.299	7.4682	14.8872	45	45	45	1.35	1.39	6.03	3.02				
3	115P06466	3 PM Peak	Weekday	AZ-95	Northbound	34.639	31.4225	10.9847	7.1383	45	45	45	1.30	1.43	4.10	6.30				
3	115P06466	4 Evening	Weekday	AZ-95	Northbound	38.814	34.7183	14.3218	10.5741	45	45	45	1.16	1.30	3.14	4.26				
3	115P06468	1 AM Peak	Weekday	AZ-95	Northbound	34.329	32.2965	5.4545	5.587	45	45	45	1.31	1.39	8.25	8.05	1.54	1.63	12.07	12.07
3	115P06468	2 Mid Day	Weekday	AZ-95	Northbound	29.251	27.6055	4.964	3.7297	45	45	45	1.54	1.63	9.07	12.07				
3	115P06468	3 PM Peak	Weekday	AZ-95	Northbound	29.366	29.3948	3.7297	3.7297	45	45	45	1.53	1.53	12.07	12.07				
3	115P06468	4 Evening	Weekday	AZ-95	Northbound	35.878	34.5895	9.0195	12.4323	45	45	45	1.25	1.30	4.99	3.62				
3	115P06469	1 AM Peak	Weekday	AZ-95	Northbound	27.045	27.9193	2.4854	6.8375	45	45	45	1.66	1.61	18.11	6.58	1.92	1.85	18.11	12.06
3	115P06469	2 Mid Day	Weekday	AZ-95	Northbound	23.383	24.9238	3.108	4.9709	45	45	45	1.92	1.81	14.48	9.05				
3	115P06469	3 PM Peak	Weekday	AZ-95	Northbound	24.169	24.3892	2.4854	3.7309	45	45	45	1.86	1.85	18.11	12.06				
3	115P06469	4 Evening	Weekday	AZ-95	Northbound	28.939	32.0685	1.3765	7.4453	45	45	45	1.55	1.40	~~32.69~~	6.04				
3	115P06470	1 AM Peak	Weekday	AZ-95	Northbound	33.269	30.2951	8.0734	10.7497	45	45	45	1.35	1.49	5.57	4.19	1.59	1.61	12.07	9.04
3	115P06470	2 Mid Day	Weekday	AZ-95	Northbound	28.383	27.9512	4.3528	5.5911	45	45	45	1.59	1.61	10.34	8.05				
3	115P06470	3 PM Peak	Weekday	AZ-95	Northbound	29.22	29.2253	3.7274	4.9762	45	45	45	1.54	1.54	12.07	9.04				
3	115P06470	4 Evening	Weekday	AZ-95	Northbound	32.952	33.3886	6.2163	12.3929	45	45	45	1.37	1.35	7.24	3.63				
3	115P06471	1 AM Peak	Weekday	AZ-95	Northbound	34.251	29.2641	11.8253	13.6717	45	45	45	1.31	1.54	3.81	3.29	1.60	1.72	7.24	6.30
3	115P06471	2 Mid Day	Weekday	AZ-95	Northbound	28.167	26.1466	6.8359	7.1444	45	45	45	1.60	1.72	6.58	6.30				
3	115P06471	3 PM Peak	Weekday	AZ-95	Northbound	29.245	28.6123	6.2163	12.1035	45	45	45	1.54	1.57	7.24	3.72				
3	115P06471	4 Evening	Weekday	AZ-95	Northbound	34.814	34.4445	9.7981	17.4373	45	45	45	1.29	1.31	4.59	2.58				
3	115P07228	1 AM Peak	Weekday		Northbound	45.498	41.9633	20.5043	9.9455	45	45	45	1.00	1.07	2.19	4.52	1.00	1.09	3.02	5.17
3	115P07228	2 Mid Day	Weekday		Northbound	45.463	41.3765	19.5823	8.7012	45	45	45	1.00	1.09	2.30	5.17				
3	115P07228	3 PM Peak	Weekday		Northbound	45.73	42.7619	14.9183	9.9455	45	45	45	1.00	1.05	3.02	4.52				
3	115P07228	4 Evening	Weekday		Northbound	46.746	43.4406	18.0195	12.4336	45	45	45	1.00	1.04	2.50	3.62				
3	115P07229	1 AM Peak	Weekday		Northbound	29.737	27.1744	10.5496	13.7956	45	45	45	1.51	1.66	4.27	3.26	1.69	1.80	10.35	4.39
3	115P07229	2 Mid Day	Weekday		Northbound	27.407	25.1254	4.3477	10.2482	45	45	45	1.64	1.79	10.35	4.39				
3	115P07229	3 PM Peak	Weekday		Northbound	26.596	25.2747	6.8321	11.7602	45	45	45	1.69	1.78	6.59	3.83				
3	115P07229	4 Evening	Weekday		Northbound	29.056	24.9872	14.3474	11.7602	45	45	45	1.55	1.80	3.14	3.83				
4	115P07220	1 AM Peak	Weekday	AZ-68	Eastbound	44.492	39.3286	23.5909	19.866	45	45	45	1.01	1.14	1.91	2.27	1.04	1.18	2.27	2.37
4	115P07220	2 Mid Day	Weekday	AZ-68	Eastbound	43.341	38.8324	21.1375	19.0085	45	45	45	1.04	1.16	2.13	2.37				
4	115P07220	3 PM Peak	Weekday	AZ-68	Eastbound	43.391	38.2781	19.866	20.482	45	45	45	1.04	1.18	2.27	2.20				
4	115P07220	4 Evening	Weekday	AZ-68	Eastbound	44.361	41.3279	23.5909	22.3914	45	45	45	1.01	1.09	1.91	2.01				
4	115P07221	1 AM Peak	Weekday	AZ-68	Eastbound	51.896	45.0917	33.5656	31.0349	52	52	52	1.00	1.15	1.55	1.68	1.00	1.18	1.55	1.84
4	115P07221	2 Mid Day	Weekday	AZ-68	Eastbound	52.524	45.6631	37.2418	28.543	52	52	52	1.00	1.14	1.40	1.82				
4	115P07221	3 PM Peak	Weekday	AZ-68	Eastbound	53.536	44.2469	33.5656	28.3362	52	52	52	1.00	1.18	1.55	1.84				
4	115P07221	4 Evening	Weekday	AZ-68	Eastbound	52.25	45.6924	33.5656	30.4311	52	52	52	1.00	1.14	1.55	1.71				
4	115P07222	1 AM Peak	Weekday	AZ-68	Eastbound	62.192	46.0841	43.6326	28.5774	65	65	65	1.05	1.41	1.49	2.27	1.10	1.44	2.01	2.40
4	115P07222	2 Mid Day	Weekday	AZ-68	Eastbound	60.315	46.8001	43.5129	27.7402	65	65	65	1.08	1.39	1.49	2.34				
4	115P07222	3 PM Peak	Weekday	AZ-68	Eastbound	61.919	45.0475	35.1284	27.0426	65	65	65	1.05	1.44	1.85	2.40				
4	115P07222	4 Evening	Weekday	AZ-68	Eastbound	59.226	46.1017	32.3024	27.9726	65	65	65	1.10	1.41	2.01	2.32				
5	115P07222	1 AM Peak	Weekday	AZ-68	Eastbound	62.192	46.0841	43.6326	28.5774	65	65	65	1.05	1.41	1.49	2.27	1.10	1.44	2.01	2.40

5	115P07222	2 Mid Day	Weekday	AZ-68	Eastbound	60.315	46.8001	43.5129	27.7402	65	65	65	1.08	1.39	1.49	2.34			
5	115P07222	3 PM Peak	Weekday	AZ-68	Eastbound	61.919	45.0475	35.1284	27.0426	65	65	65	1.05	1.44	1.85	2.40			
5	115P07222	4 Evening	Weekday	AZ-68	Eastbound	59.226	46.1017	32.3024	27.9726	65	65	65	1.10	1.41	2.01	2.32			
5	115P07223	1 AM Peak	Weekday	AZ-68	Eastbound	65.147	59.2408	48.5026	40.4082	65	65	65	1.00	1.10	1.34	1.61	1.02	1.10	1.40	1.69
5	115P07223	2 Mid Day	Weekday	AZ-68	Eastbound	64.201	58.9725	49.9315	38.5204	65	65	65	1.01	1.10	1.30	1.69				
5	115P07223	3 PM Peak	Weekday	AZ-68	Eastbound	65.265	59.2266	49.1275	38.5204	65	65	65	1.00	1.10	1.32	1.69				
5	115P07223	4 Evening	Weekday	AZ-68	Eastbound	63.434	59.517	46.4003	41.9645	65	65	65	1.02	1.09	1.40	1.55				
6	115P07223	1 AM Peak	Weekday	AZ-68	Eastbound	65.147	59.2408	48.5026	40.4082	65	65	65	1.00	1.10	1.34	1.61	1.02	1.10	1.40	1.69
6	115P07223	2 Mid Day	Weekday	AZ-68	Eastbound	64.201	58.9725	49.9315	38.5204	65	65	65	1.01	1.10	1.30	1.69				
6	115P07223	3 PM Peak	Weekday	AZ-68	Eastbound	65.265	59.2266	49.1275	38.5204	65	65	65	1.00	1.10	1.32	1.69				
6	115P07223	4 Evening	Weekday	AZ-68	Eastbound	63.434	59.517	46.4003	41.9645	65	65	65	1.02	1.09	1.40	1.55				
6	115P07224	1 AM Peak	Weekday	AZ-68	Eastbound	56.371	56.5036	42.2511	43.3699	49	49	49	1.00	1.00	1.16	1.13	1.00	1.00	1.29	1.24
6	115P07224	2 Mid Day	Weekday	AZ-68	Eastbound	54.92	55.1924	39.7763	39.4383	49	49	49	1.00	1.00	1.23	1.24				
6	115P07224	3 PM Peak	Weekday	AZ-68	Eastbound	56.2	56.8556	41.3721	43.5054	49	49	49	1.00	1.00	1.18	1.13				
6	115P07224	4 Evening	Weekday	AZ-68	Eastbound	55.31	56.0735	38.0375	41.6818	49	49	49	1.00	1.00	1.29	1.18				
7	115P07224	1 AM Peak	Weekday	AZ-68	Eastbound	56.371	56.5036	42.2511	43.3699	49	49	49	1.00	1.00	1.16	1.13	1.00	1.00	1.29	1.24
7	115P07224	2 Mid Day	Weekday	AZ-68	Eastbound	54.92	55.1924	39.7763	39.4383	49	49	49	1.00	1.00	1.23	1.24				
7	115P07224	3 PM Peak	Weekday	AZ-68	Eastbound	56.2	56.8556	41.3721	43.5054	49	49	49	1.00	1.00	1.18	1.13				
7	115P07224	4 Evening	Weekday	AZ-68	Eastbound	55.31	56.0735	38.0375	41.6818	49	49	49	1.00	1.00	1.29	1.18				

Car TTI and PTI/Truck TTTI and TPTI – Southbound/Westbound

Segment	TMC	timeperiod	week_type	road_direction	cars_mean	trucks_mean	cars_P05	trucks_P05	Posted Speed limit	Assumed car free-flow speed	Assumed truck free-flow speed	cars_TTI	Trucks_TTI	cars_PTI	Trucks_PTI	Cars_PeakTTI	Trucks_PeakTTI	Cars_PeakPTI	Trucks_PeakPTI
1	115N06459	1 AM Peak	Weekday	Southbound	49.554	47.6416	37.7837	29.8339	49	49	49	1.00	1.03	1.30	1.64	1.01	1.04	1.46	1.64
1	115N06459	2 Mid Day	Weekday	Southbound	48.365	47.1497	36.6853	30.7799	49	49	49	1.01	1.04	1.34	1.59				
1	115N06459	3 PM Peak	Weekday	Southbound	49.11	47.5245	34.8131	32.9497	49	49	49	1.00	1.03	1.41	1.49				
1	115N06459	4 Evening	Weekday	Southbound	50.531	48.5603	33.5632	37.5588	49	49	49	1.00	1.01	1.46	1.30				
1	115N07230	1 AM Peak	Weekday	Southbound	36.734	34.1286	26.4946	22.055	35	35	35	1.00	1.03	1.32	1.59	1.00	1.05	1.61	1.59
1	115N07230	2 Mid Day	Weekday	Southbound	35.426	33.2156	22.4185	22.5424	35	35	35	1.00	1.05	1.56	1.55				
1	115N07230	3 PM Peak	Weekday	Southbound	36.099	33.5455	23.5848	22.5424	35	35	35	1.00	1.04	1.48	1.55				
1	115N07230	4 Evening	Weekday	Southbound	36.17	33.4701	21.703	24.8791	35	35	35	1.00	1.05	1.61	1.41				
2	115N06460	1 AM Peak	Weekday	Southbound	48.238	46.8124	29.6579	30.4088	53	53	53	1.10	1.13	1.79	1.74	1.13	1.16	2.02	2.08
2	115N06460	2 Mid Day	Weekday	Southbound	46.879	45.658	27.2988	25.466	53	53	53	1.13	1.16	1.94	2.08				
2	115N06460	3 PM Peak	Weekday	Southbound	47.92	46.1099	26.3025	29.1776	53	53	53	1.11	1.15	2.02	1.82				
2	115N06460	4 Evening	Weekday	Southbound	49.981	48.0169	28.5987	37.5358	53	53	53	1.06	1.10	1.85	1.41				
2	115N06461	1 AM Peak	Weekday	Southbound	39.886	35.8471	21.7643	12.4442	45	45	45	1.13	1.26	2.07	3.62	1.20	1.29	2.79	3.62
2	115N06461	2 Mid Day	Weekday	Southbound	37.565	35.0073	18.644	12.4442	45	45	45	1.20	1.29	2.41	3.62				
2	115N06461	3 PM Peak	Weekday	Southbound	37.979	36.6254	16.1543	16.7796	45	45	45	1.18	1.23	2.79	2.68				
2	115N06461	4 Evening	Weekday	Southbound	40.934	35.1299	19.7033	1.8644	45	45	45	1.10	1.28	2.28	~~24.14~~	-	-	-	-
2	115N06462	1 AM Peak	Weekday	Southbound	39.581	36.3427	19.9011	8.7022	45	45	45	1.14	1.24	2.26	5.17	1.24	1.39	4.26	8.04
2	115N06462	2 Mid Day	Weekday	Southbound	36.153	32.4651	13.9814	5.5947	45	45	45	1.24	1.39	3.22	8.04				
2	115N06462	3 PM Peak	Weekday	Southbound	36.908	34.2707	13.6606	7.4577	45	45	45	1.22	1.31	3.29	6.03				
2	115N06462	4 Evening	Weekday	Southbound	38.901	36.606	10.5688	7.4577	45	45	45	1.16	1.23	4.26	6.03				
2	115N06463	1 AM Peak	Weekday	Southbound	37.634	32.8497	15.5185	12.1057	45	45	45	1.20	1.37	2.90	3.72	1.38	1.48	5.57	4.26
2	115N06463	2 Mid Day	Weekday	Southbound	33.017	30.857	11.1781	10.5706	45	45	45	1.36	1.46	4.03	4.26				
2	115N06463	3 PM Peak	Weekday	Southbound	32.672	30.4631	8.0817	10.5706	45	45	45	1.38	1.48	5.57	4.26				
2	115N06463	4 Evening	Weekday	Southbound	39.538	38.8196	17.3659	19.8468	45	45	45	1.14	1.16	2.59	2.27				
2	115N06459	1 AM Peak	Weekday	Southbound	49.554	47.6416	37.7837	29.8339	49	49	49	1.00	1.03	1.30	1.64	1.01	1.04	1.46	1.64
2	115N06459	2 Mid Day	Weekday	Southbound	48.365	47.1497	36.6853	30.7799	49	49	49	1.01	1.04	1.34	1.59				
2	115N06459	3 PM Peak	Weekday	Southbound	49.11	47.5245	34.8131	32.9497	49	49	49	1.00	1.03	1.41	1.49				
2	115N06459	4 Evening	Weekday	Southbound	50.531	48.5603	33.5632	37.5588	49	49	49	1.00	1.01	1.46	1.30				
3	115N06465	1 AM Peak	Weekday	Southbound	36.557	34.363	11.2022	11.7857	45	45	45	1.23	1.31	4.02	3.82	1.37	1.52	7.24	12.07
3	115N06465	2 Mid Day	Weekday	Southbound	32.94	29.6699	6.2166	3.7279	45	45	45	1.37	1.52	7.24	12.07				
3	115N06465	3 PM Peak	Weekday	Southbound	33.863	30.2258	6.8364	1.864	45	45	45	1.33	1.49	6.58	24.14				
3	115N06465	4 Evening	Weekday	Southbound	38.864	33.7662	11.2022	1.864	45	45	45	1.16	1.33	4.02	~~24.14~~				
3	115N06467	1 AM Peak	Weekday	Southbound	38.829	33.1713	19.9998	12.4323	45	45	45	1.16	1.36	2.25	3.62	1.26	1.37	2.77	3.62
3	115N06467	2 Mid Day	Weekday	Southbound	35.829	33.5775	16.2352	17.4682	45	45	45	1.26	1.34	2.77	2.58				
3	115N06467	3 PM Peak	Weekday	Southbound	37.069	32.8578	18.9039	16.8291	45	45	45	1.21	1.37	2.38	2.67				

3	115N06467	4 Evening	Weekday	Southbound	40.117	36.9746	22.6228	15.5055	45	45	45	1.12	1.22	1.99	2.90				
3	115N06468	1 AM Peak	Weekday	Southbound	29.194	26.3504	8.6797	5.6026	45	45	45	1.54	1.71	5.18	8.03	1.77	1.94	9.05	9.05
3	115N06468	2 Mid Day	Weekday	Southbound	25.425	23.199	5.6026	4.9709	45	45	45	1.77	1.94	8.03	9.05				
3	115N06468	3 PM Peak	Weekday	Southbound	25.871	23.5323	4.9709	4.9709	45	45	45	1.74	1.91	9.05	9.05				
3	115N06468	4 Evening	Weekday	Southbound	32.598	32.0449	10.1527	11.7971	45	45	45	1.38	1.40	4.43	3.81				
3	115N06469	2 Mid Day	Weekday	Southbound	26.312	24.4231	4.9762	4.9762	45	45	45	1.71	1.84	9.04	9.04				
3	115N06469	3 PM Peak	Weekday	Southbound	27.119	25.675	4.3528	6.827	45	45	45	1.66	1.75	10.34	6.59				
3	115N06469	4 Evening	Weekday	Southbound	31.851	31.5904	4.6659	7.4548	45	45	45	1.41	1.42	9.64	6.04				
3	115N06470	2 Mid Day	Weekday	Southbound	28.097	24.9704	7.4551	4.97	45	45	45	1.60	1.80	6.04	9.05				
3	115N06470	3 PM Peak	Weekday	Southbound	28.841	27.9718	5.5913	8.7002	45	45	45	1.56	1.61	8.05	5.17				
3	115N06470	4 Evening	Weekday	Southbound	35.682	32.5827	9.6375	6.8359	45	45	45	1.26	1.38	4.67	6.58				
3	115N06471	1 AM Peak	Weekday	Southbound	39.218	33.2653	19.6381	9.9471	45	45	45	1.15	1.35	2.29	4.52	1.24	1.47	2.93	9.05
3	115N06471	2 Mid Day	Weekday	Southbound	36.34	30.7048	16.2624	4.9717	45	45	45	1.24	1.47	2.77	9.05				
3	115N06471	3 PM Peak	Weekday	Southbound	37.422	31.5165	15.3386	4.9717	45	45	45	1.20	1.43	2.93	9.05				
3	115N06471	4 Evening	Weekday	Southbound	40.161	34.7126	18.0266	8.6987	45	45	45	1.12	1.30	2.50	5.17				
3	115N07229	1 AM Peak	Weekday	Southbound	33.344	29.0004	26.082	21.735	45	45	45	1.35	1.55	1.73	2.07	1.39	1.64	2.24	2.42
3	115N07229	2 Mid Day	Weekday	Southbound	32.478	28.6143	23.7109	20.0631	45	45	45	1.39	1.57	1.90	2.24				
3	115N07229	3 PM Peak	Weekday	Southbound	32.286	27.501	20.0631	18.63	45	45	45	1.39	1.64	2.24	2.42				
3	115N07229	4 Evening	Weekday	Southbound	33.679	28.6886	26.082	20.0631	45	45	45	1.34	1.57	1.73	2.24				
3	115N06464	1 AM Peak	Weekday	Southbound	41.878	39.4201	24.5637	20.5042	45	45	45	1.07	1.14	1.83	2.19	1.18	1.27	2.45	4.26
3	115N06464	2 Mid Day	Weekday	Southbound	38.185	35.4024	18.3458	11.8064	45	45	45	1.18	1.27	2.45	3.81				
3	115N06464	3 PM Peak	Weekday	Southbound	39.047	35.3251	18.6259	10.5628	45	45	45	1.15	1.27	2.42	4.26				
3	115N06464	4 Evening	Weekday	Southbound	43.113	40.4265	22.7329	20.1653	45	45	45	1.04	1.11	1.98	2.23				
4	115N07220	1 AM Peak	Weekday	Westbound	54.083	44.4292	38.0572	17.1925	52	52	52	1.00	1.17	1.37	3.02	1.00	1.21	1.47	3.35
4	115N07220	2 Mid Day	Weekday	Westbound	53.672	43.1152	35.7981	15.5243	52	52	52	1.00	1.21	1.45	3.35				
4	115N07220	3 PM Peak	Weekday	Westbound	55.352	44.063	35.4742	17.1214	52	52	52	1.00	1.18	1.47	3.04				
4	115N07220	4 Evening	Weekday	Westbound	52.968	44.4527	37.8734	25.4539	52	52	52	1.00	1.17	1.37	2.04				
4	115N07221	1 AM Peak	Weekday	Westbound	64.29	50.1641	49.725	32.926	65	65	50	1.01	1.00	1.31	1.52	1.05	1.02	1.46	2.93
4	115N07221	2 Mid Day	Weekday	Westbound	65.304	48.8007	51.5876	17.0938	65	65	50	1.00	1.02	1.26	2.93				
4	115N07221	3 PM Peak	Weekday	Westbound	67.125	49.6234	53.6861	19.4443	65	65	50	1.00	1.01	1.21	2.57				
4	115N07221	4 Evening	Weekday	Westbound	61.891	50.0338	44.4247	28.5874	65	65	50	1.05	1.00	1.46	1.75				
4	115N07219	1 AM Peak	Weekday	Westbound	36.205	31.4317	6.5238	6.8321	45	45	45	1.24	1.43	6.90	6.59	1.29	1.48	6.90	9.04
4	115N07219	2 Mid Day	Weekday	Westbound	34.968	30.4951	8.078	4.9756	45	45	45	1.29	1.48	5.57	9.04				
4	115N07219	3 PM Peak	Weekday	Westbound	35.405	32.1485	7.4633	7.324	45	45	45	1.27	1.40	6.03	6.14				
4	115N07219	4 Evening	Weekday	Westbound	38.01	33.2907	9.9511	9.9511	45	45	45	1.18	1.35	4.52	4.52				
5	115N07222	1 AM Peak	Weekday	Westbound	64.56	56.4964	52.0489	34.1753	65	65	50	1.01	1.00	1.25	1.46	1.01	1.00	1.32	1.96
5	115N07222	2 Mid Day	Weekday	Westbound	64.338	55.6397	49.7601	27.6495	65	65	50	1.01	1.00	1.31	1.81				
5	115N07222	3 PM Peak	Weekday	Westbound	65.98	55.6092	51.5223	31.8589	65	65	50	1.00	1.00	1.26	1.57				
5	115N07222	4 Evening	Weekday	Westbound	64.083	54.7453	49.1201	25.4818	65	65	50	1.01	1.00	1.32	1.96				
5	115N07221	1 AM Peak	Weekday	Westbound	64.29	50.1641	49.725	32.926	65	65	50	1.01	1.00	1.31	1.52	1.05	1.02	1.46	2.93
5	115N07221	2 Mid Day	Weekday	Westbound	65.304	48.8007	51.5876	17.0938	65	65	50	1.00	1.02	1.26	2.93				

5	115N07221	3 PM Peak	Weekday	Westbound	67.125	49.6234	53.6861	19.4443	65	65	50	1.00	1.01	1.21	2.57				
5	115N07221	4 Evening	Weekday	Westbound	61.891	50.0338	44.4247	28.5874	65	65	50	1.05	1.00	1.46	1.75				
6	115N07222	1 AM Peak	Weekday	Westbound	64.56	56.4964	52.0489	34.1753	65	65	50	1.01	1.00	1.25	1.46	1.01	1.00	1.32	1.96
6	115N07222	2 Mid Day	Weekday	Westbound	64.338	55.6397	49.7601	27.6495	65	65	50	1.01	1.00	1.31	1.81				
6	115N07222	3 PM Peak	Weekday	Westbound	65.98	55.6092	51.5223	31.8589	65	65	50	1.00	1.00	1.26	1.57				
6	115N07222	4 Evening	Weekday	Westbound	64.083	54.7453	49.1201	25.4818	65	65	50	1.01	1.00	1.32	1.96				
6	115N07223	1 AM Peak	Weekday	Westbound	57.435	55.042	44.7492	43.2983	49	49	49	1.00	1.00	1.09	1.13	1.00	1.00	1.21	1.45
6	115N07223	2 Mid Day	Weekday	Westbound	57.035	54.4778	40.5965	33.7854	49	49	49	1.00	1.00	1.21	1.45				
6	115N07223	3 PM Peak	Weekday	Westbound	58.751	56.462	43.6709	46.7271	49	49	49	1.00	1.00	1.12	1.05				
6	115N07223	4 Evening	Weekday	Westbound	58.801	55.3105	46.6412	45.9652	49	49	49	1.00	1.00	1.05	1.07				
7	115N07223	1 AM Peak	Weekday	Westbound	57.435	55.042	44.7492	43.2983	49	49	49	1.00	1.00	1.09	1.13	1.00	1.00	1.21	1.45
7	115N07223	2 Mid Day	Weekday	Westbound	57.035	54.4778	40.5965	33.7854	49	49	49	1.00	1.00	1.21	1.45				
7	115N07223	3 PM Peak	Weekday	Westbound	58.751	56.462	43.6709	46.7271	49	49	49	1.00	1.00	1.12	1.05				
7	115N07223	4 Evening	Weekday	Westbound	58.801	55.3105	46.6412	45.9652	49	49	49	1.00	1.00	1.05	1.07				

Closure Data

Segment	Length (miles)	# of closures	# F&I	Total miles of closures		Avg Occurrences/Mile/Year	
				NB (or EB)	SB (or WB)	NB (or EB)	SB (or WB)
1	7	12	4	13.0	0.0	0.37	0.00
2	8	60	39	5.0	55.0	0.13	1.38
3	9	32	16	29.0	3.0	0.64	0.07
4	7	15	7	8.0	7.0	0.23	0.20
5	10	17	10	13.0	8.0	0.26	0.16
6	5.0	10	6	9.0	1.0	0.36	0.04
7	5	22	15	13.0	9.0	0.52	0.36

Segment	ITIS Category Description											
	Closures		Incidents/Accidents		Incidents/Crashes		Obstruction Hazards		Winds		Winter Storm Codes	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
1	0	0	11	0	0	0	1	0	0	0	0	0
2	0	0	5	53	0	0	0	2	0	0	0	0
3	0	0	27	3	0	0	2	0	0	0	0	0
4	0	0	8	7	0	0	0	0	0	0	0	0
5	0	0	13	3	0	0	0	0	0	0	0	1
6	0	0	8	1	0	0	0	0	0	0	1	0
7	0	0	13	9	0	0	0	0	0	0	0	0

HPMS Data

2011-2015 AVERAGE HPMS DATA					
WEIGHTED AVERAGES					
SEGMENT	MP_FROM	MP_TO	WEIGHTED AVERAGE NB/EB AADT	WEIGHTED AVERAGE SB/WB AADT	WEIGHTED AVERAGE AADT
95-1	226	233	5821	5806	11627
95-2	233	241	10779	10955	21734
95-3	241	250	13904	13509	27413
68-4	0	7	4471	4539	9011
68-5	7	17	3814	3849	7664
68-6	17	22	4595	4705	9300
68-7	22	27	6034	5715	11749

For Mobility					
2015					
NB/EB AADT	SB/WB AADT	2015 AADT	K Factor	D-Factor	T-Factor
6104	6152	12256	11	51	16
11312	11359	22671	10	52	13
14029	13718	27747	9	52	6
4652	4698	9351	9	50	14
3873	3907	7782	10	50	20
4546	4483	9028	10	50	22
6548	4920	11468	8	57	20

SEGMENT	Loc ID	BMP	EMP	Length	Pos Dir AADT	Neg Dir AADT	Corrected Pos Dir AADT	Corrected Neg Dir AADT	2015 AADT	K Factor	D-Factor	D-Factor Adjusted	T-Factor
95-1	101156	226.08	226.82	0.74	0	0	4357	4357	8713	9	53	50	17
	101157	226.82	227.33	0.51	0	0	4541	4541	9081	8	53	50	16
	101158	227.33	229.30	1.97	5410	5285	5410	5285	10695	11	51	51	15
	101160	229.30	230.30	1.00	6049	6053	6049	6053	12101	12	54	50	15
	101162	230.30	231.30	1.00	6692	7889	6692	7889	14581	11	53	54	17
	101164	231.30	233.00	1.70	7824	7459	7824	7459	15283	11	52	51	17
95-2	101166	234.37	236.96	2.59	6959	7535	6959	7535	14494	10	52	52	17
	101168	236.96	238.90	1.94	13431	15009	13431	15009	28440	10	52	53	10
	101170	238.90	240.70	1.80	17688	15391	17688	15391	33079	10	51	53	8
	101172	240.70	241.00	0.30	12859	14389	12859	14389	27248	9	51	53	8
	101164	233.00	234.37	1.37	7824	7459	7824	7459	15283	11	52	51	17
95-3	101173	241.45	242.80	1.35	11661	14274	11661	14274	25935	9	51	55	8
	101174	242.80	243.43	0.63	14542	13897	14542	13897	28439	9	51	51	7
	101176	243.43	243.92	0.49	14628	14561	14628	14561	29188	9	50	50	8
	101178	243.92	244.44	0.52	13827	13313	13827	13313	27140	8	52	51	8
	101180	244.44	244.89	0.45	14410	13256	14410	13256	27666	8	52	52	7
	101182	244.89	246.10	1.21	15592	11976	15592	11976	27568	9	56	57	7
	101184	246.10	246.90	0.80	17944	16099	17944	16099	34043	9	53	53	6
	101186	246.90	247.67	0.77	13789	13401	13789	13401	27190	9	50	51	6
	101188	247.67	248.48	0.81	13056	9160	13000	13000	26000	8	54	50	6
	101190	248.48	249.75	1.27	13565	13641	13565	13641	27207	9	53	50	4
	101192	249.75	250.00	0.25	12515	13578	12515	13578	26093	7	53	52	4
	101172	241.00	241.45	0.45	12859	14389	12859	14389	27248	9	51	53	8
68-4	100723	0.00	1.36	1.36	7287	7454	7287	7454	14742	9	57	51	6
	100724	1.36	2.49	1.13	4540	3821	4418	4418	8836	8	59	50	10
	100725	2.49	4.09	1.60	4500	4002	3993	3993	7986	9	62	50	15
	100726	4.09	7.00	2.91	3873	3907	3873	3907	7782	10	65	50	20
68-5	100726	7.00	17.00	10.00	3873	3907	3873	3907	7782	10	65	50	20
68-6	100727	17.80	21.79	3.99	4575	5093	4575	4575	9150	10	63	50	22
	100726	17.00	17.80	0.80	3873	3907	3873	3907	7782	10	65	50	20
	100728	21.79	22.00	0.21	6548	4920	6548	4920	11468	8	58	57	20
68-7	100728	22.00	27.47	5.47	6548	4920	6548	4920	11468	8	58	57	20

Bicycle Accommodation Data

Segment	BMP	EMP	Divided or Non	NB/EB Right Shoulder Width	SB/WB Right Shoulder Width	NB/EB Left Shoulder Width	SB/WB Left Shoulder Width	NB/EB Effective Length of Shoulder	SB/WB Effective Length of Shoulder	% Bicycle Accommodation
95N-1	226.08	233	Undivided	4.0	2.7	N/A	N/A	1.9	1.1	22%
95N-2	233	241	Undivided	1.5	1.7	N/A	N/A	0.1	0.2	1%
95N-3	241	250	Undivided	0.0	0.0	N/A	N/A	0.0	0.0	0%
68-4	0	7	Divided	8.5	9.3	2.9	2.0	5.4	5.0	74%
68-5	7	17	Divided	9.5	9.5	2.8	2.8	10.0	10.0	100%
68-6	17	22	Divided	9.3	9.6	3.9	3.8	4.8	5.0	98%
68-7	22	27.11	Undivided	10.0	9.8	N/A	N/A	5.1	4.9	98%

AZTDM Data

SEGMENT	Growth Rate	% Non-SOV
95N-1	3.46%	15.9%
95N-2	2.25%	18.8%
95N-3	4.21%	21.3%
68-4	2.58%	18.5%
68-5	1.03%	18.1%
68-6	0.91%	16.1%
68-7	0.37%	9.7%

Safety Performance Area Data

Segment	Segment Similar Operating Environment Type	Segment NB/EB Fatal Crashes	Segment SB/WB Fatal Crashes	Segment NB/EB Incapacitating Injury Crashes	Segment SB/WB Incapacitating Injury Crashes	Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors	Fatal + Incapacitating Injury Crashes Involving Trucks	Fatal + Incapacitating Injury Crashes Involving Motorcycles	Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers	Weighted Average NB/EB AADT	Weighted Average SB/WB AADT	Weighted Average Total AADT
95N-1	4 or 5 Lane Undivided Highway	0	1	2	7	4	1	0	2	5821	5806	11627
95N-2	4 or 5 Lane Undivided Highway	5	2	26	24	26	4	4	4	10779	10955	21734
95N-3	4 or 5 Lane Undivided Highway	1	9	14	14	13	2	2	4	13904	13509	27413
68-4	2 or 3 or 4 Lane Divided Highway	1	1	4	0	6	0	0	2	4471	4539	9010
68-5	2 or 3 or 4 Lane Divided Highway	2	5	6	0	6	0	9	0	3814	3849	7663
68-6	2 or 3 or 4 Lane Divided Highway	3	1	3	5	3	2	1	2	4595	4705	9300
68-7	4 or 5 Lane Undivided Highway	4	4	6	3	5	1	2	3	6034	5715	11749

HPMS Data

2011-2015 AVERAGE HPMS DATA

WEIGHTED AVERAGES for Safety

SEGMENT	MP_FROM	MP_TO	WEIGHTED AVERAGE NB/EB AADT	WEIGHTED AVERAGE SB/WB AADT	WEIGHTED AVERAGE AADT
95-1	226	233	5821	5806	11627
95-2	233	241	10779	10955	21734
95-3	241	250	13904	13509	27413
68-4	0	7	4471	4539	9011
68-5	7	17	3814	3849	7664
68-6	17	22	4595	4705	9300
68-7	22	27	6034	5715	11749

2015			2014			2013			2012			2011		
NB/EB AADT	SB/WB AADT	2015 AADT	NB/EB AADT	SB/WB AADT	2014 AADT	NB/EB AADT	SB/WB AADT	2013 AADT	NB/EB AADT	SB/WB AADT	2012 AADT	NB/EB AADT	SB/WB AADT	2011 AADT
6104	6152	12256	5600	5581	11181	5184	5280	10464	5258	5137	10395	6958	6882	13840
11312	11359	22671	10409	10927	21336	10475	10639	21113	10739	10715	21454	10961	11136	22097
14029	13718	27747	13708	13188	26896	13874	13294	27168	13988	13490	27478	13920	13854	27774
4652	4698	9351	4519	4567	9087	4306	4491	8798	4203	4283	8487	4677	4654	9331
3873	3907	7782	3759	3794	7553	3597	3640	7238	3791	3855	7648	4050	4050	8100
4546	4483	9028	4246	4748	8994	4193	4200	8393	4444	4552	8996	5544	5544	11087
6548	4920	11468	6500	6352	12852	5747	5747	11493	5343	5526	10869	6032	6032	12063

Freight Performance Area Data

				Total minutes of closures		Avg Mins/Mile/Year	
Segment	Length (miles)	# of closures	# F&I	NB (or EB)	SB (or WB)	NB (or EB)	SB (or WB)
1	7	12	4	1481.0	0.0	42.31	0.00
2	8	60	39	634.0	9050.0	15.85	226.25
3	9	32	16	2515.0	204.0	55.89	4.53
4	7	15	7	1194.0	1190.0	34.11	34.00
5	10	17	10	2221.0	1762.0	44.42	35.24
6	5.0	10	6	3217.0	89.0	128.68	3.56
7	5	22	15	1495.0	1088.0	59.80	43.52

	ITIS Category Description											
	Closures		Incidents/Accidents		Incidents/Crashes		Obstruction Hazards		Winds		Winter Storm Codes	
Segment	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
1	0	0	11	0	0	0	1	0	0	0	0	0
2	0	0	5	53	0	0	0	2	0	0	0	0
3	0	0	27	3	0	0	2	0	0	0	0	0
4	0	0	8	7	0	0	0	0	0	0	0	0
5	0	0	13	3	0	0	0	0	0	0	0	1
6	0	0	8	1	0	0	0	0	0	0	1	0
7	0	0	13	9	0	0	0	0	0	0	0	0

See the **Mobility Performance Area Data** section for other Freight Performance Area related data.

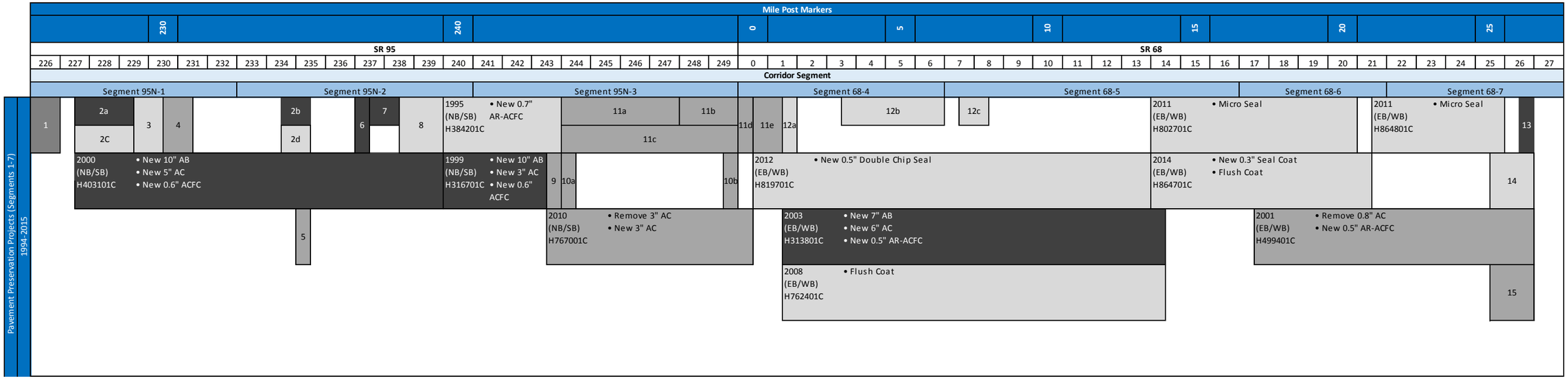
Appendix D: Needs Analysis Contributing Factors and Scores

Pavement Performance Needs Analysis

Segment #	Segment Length (miles)	Segment Mileposts (MP)	Final Need	Bid History Investment	PeCos History Investment	Resulting Historical Investment	Contributing Factors and Comments
95N-1	7	226-233	Low	Low	Low	Low	Last major paving in 2000; significant traffic volume increase since that time
95N-2	8	233-241	Medium	Medium	Medium	Medium	Last major paving in 2000; significant traffic volume increase since that time
95N-3	9	241-250	Low	Medium	Low	Medium	Last major paving in 2010; significant traffic volume increase since that time
68-4	7	0-7	None	Medium	Low	Medium	
68-5	10	7-17	None	Low	Low	Low	
68-6	5	17-22	Low	Low	Low	Low	
68-7	5	22-27	None	Medium	Low	Medium	

Pavement History

SR 68/SR 95 Pavement History



Pavement Treatment Reference Numbers	
1. 2003 (NB/SB) H556801C: Remove 2.5" AC, 2.5" AC, 0.5 ACFC	**10 b. 2008 (NB/SB) H742801C:** Remove 3" AC, 3" AC
2 a. 1996 (NB) H407701C: 6" AB, 4" AC, 0.5" AR-ACFC, Fog Coat	**11 a. 2003 (NB) H527201C:** Remove 0.5", 0.5" AR-ACFC
2 b. 1996 (NB) H407701C: 6" AB, 4" AC, 0.5" AR-ACFC, Fog Coat	**11 b. 2003 (NB) H527201C:** Remove 3", 2.5" AC, 0.5" AR-ACFC
2 c. 1996 (SB) H407701C: Flush Coat	**11 c. 2003 (SB) H527201C:** Remove 3", 2.5" AC, 0.5" AR-ACFC
2 d. 1996 (SB) H407701C: Flush Coat	**11 d. 2003 (EB/WB) H527201C:** Remove 0.5", 0.5" AR-ACFC
3. 2008 (NB/SB) H737901C: Flush Coat	**11 e. 2003 (EB/WB) H527201C:** 0.5" AR-ACFC
4. 2011 (NB/SB) H718401C: Remove 3" AC, 2.5" AC, 0.5" ACFC	**12 a. 1998 (EB/WB) H472301C:** 0.5" AR-ACFC
5. 2009 (NB/SB) HX16601C: Remove 0.5" AC, 0.5" ACFC	**12 b. 1998 (EB) H472301C:** 0.5" AR-ACFC
6. 1994 (NB/SB) H275401C: 9" AB, 5" AC, 0.5" ACFC	**12 c. 1998 (EB) H472301C:** 0.5" AR-ACFC
7. 2007 (NB) H597201C: 10" AB, 5" AC, 0.5" ACFC	**13. 1998 (EB/WB) H286501C:** 5: AB, 5.5" AC, 0.5" AR-ACFC
8. 1996 (NB/SB) H316702C: 0.5" ACFC	**14. 2010 (EB/WB) H794601C:** Micro Seal
9. 2007 (NB/SB) H711301C: Remove 3" AC, 2.5" AC, 0.5" ACFC	**15. 2011 (EB/WB) H805401C:** Remove 4.5" AC, 4" AC, 0.5" AR-ACFC
10 a. 2008 (NB/SB) H742801C: Remove 3" AC, 3" AC	

Legend

- New Paving or Reconstruction
- Mill and Overlay (Adding Structural Thickness)
- Mill and Replace (No Change Structural Thickness)
- Fog Coat or Thin Overlay Treatments
- PCCP Pavement Border
- AC Pavement Border

Value	Level	Segment Number													
		1		2		3		4		5		6		7	
		Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir
1	L1	29%		13%			33%	50%	7%	10%			80%		67%
1			14%		19%				93%		70%		90%		25%
1					13%				79%		75%		10%		
1											30%				
1											30%				
3	L2		14%		6%		6%		21%				90%		83%
3							11%								25%
3							72%								
3							67%								
3															
3															
4	L3		14%												
4															
4															
4															
6	L4	79%		88%		28%		79%		75%					8%
6		29%		13%											
6					6%										
6				13%											
6					13%										
6															
Sub-Total		6.7	1.1	6.9	1.6	1.7	5.0	5.2	2.4	4.6	2.1	0.0	4.5	0.0	4.7
Total		**4.5**		**5.1**		**5.8**		**5.0**		**4.4**		**4.5**		**4.7**	

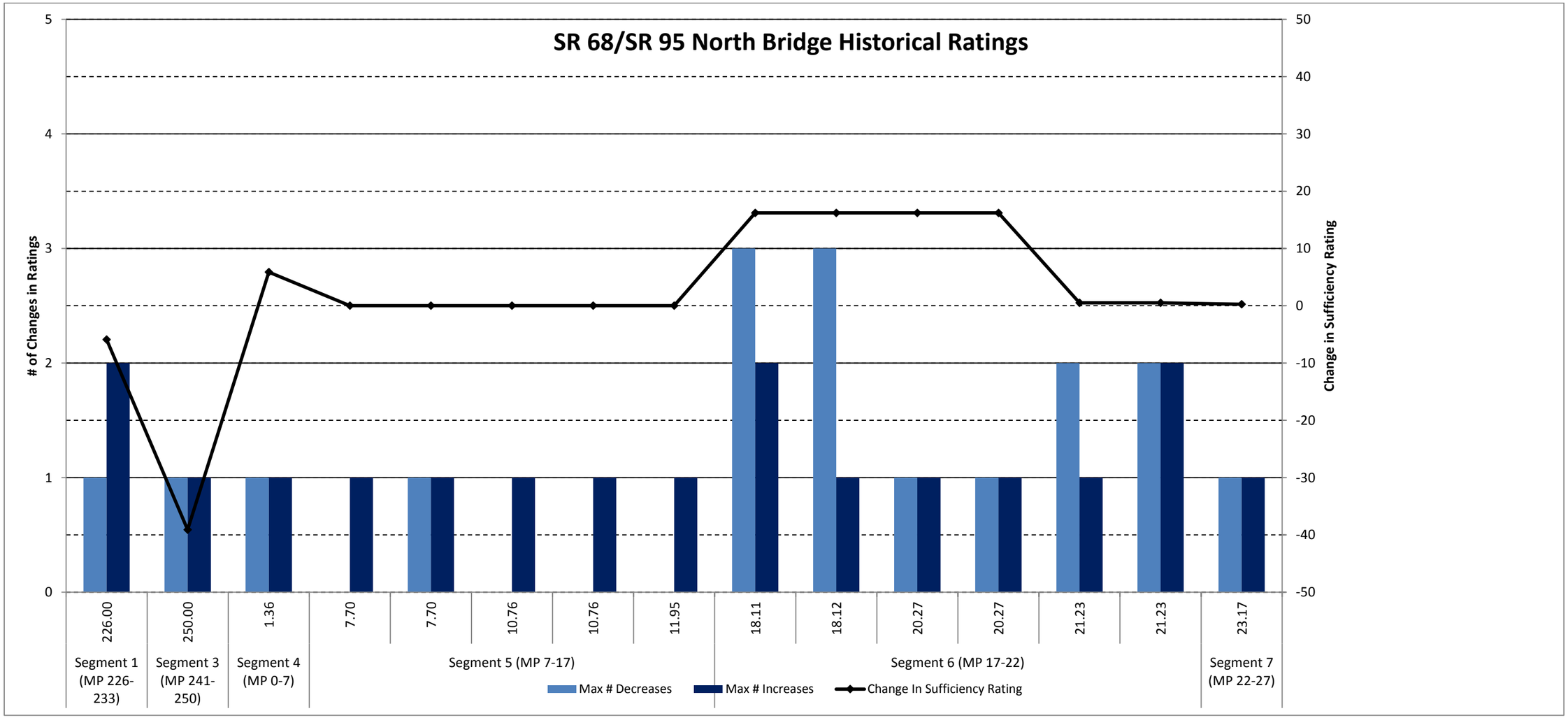
Pavement Bid History Investment (Standard Calculation Level Totals)

Value	Level	Segment Number						
		1	**2**	**3**	**4**	**5**	**6**	**7**
1	L1	0.3	0.4	0.3	2.0	2.1	1.8	0.9
3	L2	0.4	0.2	4.7	0.6	0.0	2.7	3.3
4	L3	0.6	0.0	0.0	0.0	0.0	0.0	0.0
6	L4	3.2	4.5	0.8	2.4	2.3	0.0	0.5
Total		4.5	5.1	5.8	5.0	4.4	4.5	4.7

Bridge Performance Needs Analysis

Segment #	Segment Length (Miles)	Segment Mileposts (MP)	Number of Bridges in Segment	# Functionally Obsolete Bridges	Final Need	Contributing Factors			Comments
						Bridge	Current Ratings	Historical Review	
95N-1	7	226-233	1	0	High	Needles Bridge #2435 MP 226.07	2016 deck rating of 4	This structure was not identified in historical review	Needles Bridge is structurally deficient; City of Needles has developed scoping letter for repaving of Needles Bridge
95N-2	8	233-241	0	0	None	-			No bridges in segment
95N-3	9	241-250	1	1	High	Laughlin Br-Colo Rvr #2539 MP 250.00	2015 evaluation rating of 5	Laughlin Br-Colo Rvr has potential repetitive investment issue - identified in the historical review due to a decrease in sufficiency rating > 20 points	Laughlin Br-Colo Rvr is functionally obsolete; Nevada DOT has project programmed in 2021 to widen Laughlin Bridge to add sidewalk and shoulders but no additional lanes
68-4	7	0-7	1	0	None	No Bridges with current ratings less than 6 and no historical issues			
68-5	10	7-17	5	0	None	No Bridges with current ratings less than 6 and no historical issues			
68-6	5	17-22	6	0	None	None	None	Both Sacramento Wash Br WB and Sacramento Wash Br EB bridges identified in the historical review (bridge ratings decreased three times)	
68-7	5	22-27	1	0	None	No Bridges with current ratings less than 6 and no historical issues			

Bridge Ratings History



O identifies the bridge indicated is of concern from a historical ratings perspective

Maximum # of Decreases: Maximum number of times that the Deck Rating, Substructure Rating, or Superstructure Rating decreased from 1997 to 2014. (Higher number could indicate a more dramatic decline in the performance of the bridge)

Maximum # of Increases: Maximum number of times that the Deck Rating, Substructure Rating, or Superstructure Rating increased from 1997 to 2014. (Higher number could indicate a higher level of investment)

Change in Sufficiency Rating: Cumulative change in Sufficiency Rating from 1997 to 2014. (Bigger negative number could indicate a more dramatic decline in the performance of the bridge)

Mobility Performance Needs Analysis

Segment #	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Roadway Variables								Traffic Variables					Relevant Mobility Related Existing Infrastructure
				Functional Classification	Environmental Type (Urban/Rural)	Terrain	# of Lanes/ Direction	Speed Limit	Aux Lanes	Divided/ Non-Divided	% No Passing	Existing LOS	Future 2035 LOS	% Trucks	NB Buffer Index (PTI-TTI)	SB Buffer Index (PTI-TTI)	
95N-1	226-233	7	Medium	State Highway	Rural	Level	2	35-55	No	Non-Divided	0%	E/F	E/F	16%	0.85	0.53	Traffic signals at folllowing locations: MPs 227.28, 229.30, 230.30 and 231.30
95N-2	233-241	8	High	State Highway	Fringe Urban	Level	4	45-55	No	Non-Divided	0%	D	E/F	13%	2.21	2.02	Traffic signals at following locations: MPs 234.40, 235.27, 235.40, 236.38, 237.42, 237.85, 238.42, 240.40 and 240.70
95N-3	241-250	9	High	State Highway	Fringe Urban	Level	4	45	No	Non-Divided	0%	E/F	E/F	6%	6.81	4.20	Traffic signals at following locations: MPs 241.16, 242.20, 242.55, 242.80, 243.42, 243.94, 244.18, 244.41, 244.94, 245.30, 245.60, 246.08, 246.58, 247.55, 247.95, 248.47, 249.40, 249.60, and 249.81; permanent traffic counter MP 249.0
68-4	0-7	7	Low	State Highway	Rural	Mountainous	4	45-65	No	Both	0%	A-C	A-C	14%	0.90	2.16	Traffic signal at MP 0.75; permanent traffic counter MP 0.4
68-5	7-17	10	Low	State Highway	Rural	Mountainous	4	65 (Truck 50 WB)	No	Divided	0%	A-C	A-C	20%	0.65	0.36	Safety pullout WB MP 11.9; formal pullout WB MP 13.9; permanent traffic counter MP 14.5
68-6	17-22	5	Low	State Highway	Fringe Urban	Level	4	65	No	Divided	0%	A-C	A-C	22%	0.33	0.26	
68-7	22-27	5	Low	State Highway	Fringe Urban	Level	4	45-55	No	Non-Divided	0%	A-C	A-C	20%	0.29	0.21	DMS EB MP 26.4

Mobility Performance Needs Analysis (continued)

Segment #	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Closure Extent							Non-Actionable Conditions	Programmed and Planned Projects or Issues from Previous Documents Relevant to Final Need	Contributing Factors
				Total Number of Closures	# Incidents/ Accidents	% Incidents/ Accidents	# Obstructions/ Hazards	% Obstructions/ Hazards	# Weather Related	% Weather Related			
95N-1	226-233	7	Medium	12	11	92%	1	8%	0	0%			Percentage of closures due to obstructions/hazards above the statewide average (8% to 3%) Capacity constraints due to the ~1 mile stretch of two-lane roadway Bicycle accommodation is poor due to lack of shoulder or narrow shoulders
95N-2	233-241	8	High	60	58	97%	2	3%	0	0%		Programmed: Construct raised median, Teller Road to Aztec Road (design in 2018, construction in 2019); Programmed: Construct roundabout, Aztec Road MP 237.9 (design in 2018, construction in 2019); Programmed: Construct raised median, Aztec Road to Valencia Road (design in 2018, construction in 2020); Programmed: Construct roundabout, Camp Mohave Road MP 238.3 (design in 2018, construction in 2019) Programmed: Construct new bridge across Colorado River at Bullhead Parkway South alignment (construction by Clark County in 2018)	Percentage of closures due to incidents/accidents above the statewide average (97% to 96%); percentage of closures due to obstructions/hazards above the statewide average (4% to 3%) The future V/C due to the projected growth aids in the High Final Need Bicycle accommodation is poor due to lack of shoulder or narrow shoulders
95N-3	241-250	9	High	32	30	94%	2	6%	0	0%			Percentage of closures due to obstructions/hazards above the statewide average (6% to 3%) The future V/C due to the projected growth aids in the High Final Need Bicycle accommodation is poor due to lack of shoulder or narrow shoulders
68-4	0-7	7	Low	15	15	100%	0	0%	0	0%			Percentage of closures due to incidents/accidents above the statewide average (100% to 96%)

68-5	7-17	10	Low	17	16	94%	0	0%	1	6%		Planned: Construct raised medians and intersection improvements, MP 16.8-27.2	Percentage of closures due to weather above the statewide average (6% to 1%)
68-6	17-22	5	Low	10	9	90%	0	0%	1	10%		Planned: Construct raised medians and intersection improvements, MP 16.8-27.2	Percentage of closures due to weather above the statewide average (10% to 1%)
68-7	22-27	5	Low	22	22	100%	0	0%	0	0%		Planned: Construct raised medians and intersection improvements, MP 16.8-27.2	Percentage of closures due to incidents/accidents above the statewide average (100% to 96%)

Safety Performance Needs Analysis

	Segment Number	95N-1	95N-2	95N-3	68-4	68-5	68-6	68-7	Corridor-Wide Crash Characteristics
	Segment Length (miles)	7	8	9	7	10	5	5	
	Segment Milepost (MP)	226-233	233-241	241-250	0-7	7-17	17-22	22-27	
	Final Need	Low	High	High	High	High	High	High	
	Segment Crash Overview	1 Crash was fatal 9 Crashes had incapacitating injuries 1 Crash involves trucks 2 Crashes involve pedestrians/bikes 0 Crashes involve motorcycles	7 Crashes were fatal 50 Crashes had incapacitating injuries 4 Crashes involve trucks 4 Crashes involve pedestrians/bikes 4 Crashes involve motorcycles	10 Crashes were fatal 28 Crashes had incapacitating injuries 2 Crashes involve trucks 4 Crashes involve pedestrians/bikes 2 Crashes involve motorcycles	2 Crashes were fatal 4 Crashes had incapacitating injuries 0 Crashes involve trucks 2 Crashes involve pedestrians/bikes 0 Crashes involve motorcycles	7 Crashes were fatal 6 Crashes had incapacitating injuries 0 Crashes involve trucks 0 Crashes involve pedestrians/bikes 9 Crashes involve motorcycles	4 Crashes were fatal 8 Crashes had incapacitating injuries 2 Crashes involve trucks 2 Crashes involve pedestrians/bikes 1 Crash involves motorcycles	8 Crashes were fatal 9 Crashes had incapacitating injuries 1 Crash involves trucks 3 Crashes involve pedestrians/bikes 2 Crashes involve motorcycles	39 Crashes were fatal 114 Crashes had incapacitating injuries 10 Crashes involve trucks 17 Crashes involve pedestrians/bikes 18 Crashes involve motorcycles
Segment Crash Summaries (Fatal and Serious Injury Crashes)	First Harmful Event Type	80% Involve Collision with Motor Vehicle 20% Involve Collision with Pedestrian	86% Involve Collision with Motor Vehicle 7% Involve Collision with Pedestrian 5% Involve Overturning	84% Involve Collision with Motor Vehicle 5% Involve Collision with Fixed Object 5% Involve Collision with Pedestrian	40% Involve Collision with Motor Vehicle 40% Involve Collision with Pedestrian 20% Involve Overturning	46% Involve Overturning 31% Involve Collision with Fixed Object 15% Involve Other Non-Collision	67% Involve Collision with Motor Vehicle 17% Involve Collision with Pedestrian 17% Involve Overturning	71% Involve Collision with Motor Vehicle 18% Involve Collision with Pedestrian 6% Involve Overturning	74% Involve Collision with Motor Vehicle 10% Involve Collision with Pedestrian 9% Involve Overturning
	Collision Type	20% Involve Angle 20% Involve Left Turn 20% Involve Head On	32% Involve Left Turn 25% Involve Rear End 9% Involve Head On	32% Involve Left Turn 21% Involve Rear End 13% Involve Angle	33% Involve Other 17% Involve Rear End 17% Involve Head On	85% Involve Single Vehicle 8% Involve Other 8% Involve Rear End	33% Involve Angle 17% Involve Left Turn 17% Involve Other	29% Involve Left Turn 24% Involve Other 18% Involve Angle	25% Involve Left Turn 18% Involve Rear End 16% Involve Single Vehicle
	Violation or Behavior	30% Involve Other 20% Involve Failure to Yield Right-of-Way 20% Involve Unsafe Lane Change	30% Involve Failure to Yield Right-of-Way 19% Involve Inattention/Distraction 19% Involve Speed too Fast for Conditions	24% Involve Failure to Yield Right-of-Way 24% Involve Disregarded Traffic Signal 8% Involve Drove in Opposing Lane	33% Involve Speed too Fast for Conditions 17% Involve Followed Too Closely 17% Involve Drove in Opposing Lane	54% Involve Speed too Fast for Conditions 15% Involve No Improper Action 8% Involve Faulty/Missing Equipment	33% Involve Failure to Yield Right-of-Way 17% Involve Speed too Fast for Conditions 8% Involve No Improper Action	41% Involve Failure to Yield Right-of-Way 24% Involve Drove in Opposing Lane 12% Involve No Improper Action	25% Involve Failure to Yield Right-of-Way 17% Involve Speed too Fast for Conditions 13% Involve Inattention/Distraction
	Lighting Conditions	80% Occur in Daylight Conditions 10% Occur in Dawn Conditions 10% Occur in Dark-Unlighted Conditions	70% Occur in Daylight Conditions 19% Occur in Dark-Lighted Conditions 7% Occur in Dark-Unlighted Conditions	58% Occur in Daylight Conditions 34% Occur in Dark-Lighted Conditions 5% Occur in Dusk Conditions	67% Occur in Dark-Unlighted Conditions 33% Occur in Daylight Conditions	77% Occur in Daylight Conditions 15% Occur in Dark-Unlighted Conditions 8% Occur in Dark-Lighted Conditions	75% Occur in Daylight Conditions 17% Occur in Dark-Unlighted Conditions 8% Occur in Dusk Conditions	71% Occur in Daylight Conditions 29% Occur in Dark-Unlighted Conditions	67% Occur in Daylight Conditions 16% Occur in Dark-Lighted Conditions 12% Occur in Dark-Unlighted Conditions
	Surface Conditions	90% Involve Dry Conditions 10% Involve Unknown Conditions	93% Involve Dry Conditions 5% Involve Wet Conditions 2% Involve Unknown Conditions	100% Involve Dry Conditions	100% Involve Dry Conditions	85% Involve Dry Conditions 8% Involve Ice/Frost Conditions 8% Involve Wet Conditions	100% Involve Dry Conditions	94% Involve Dry Conditions 6% Involve Wet Conditions	95% Involve Dry Conditions 3% Involve Wet Conditions 1% Involve Unknown Conditions
	First Unit Event	80% Involve a first unit event of Motor Vehicle in Transport 10% Involve a first unit event of Ran Off the Road (Left) 10% Involve a first unit event of Collision with Pedestrian	67% Involve a first unit event of Motor Vehicle in Transport 18% Involve a first unit event of Crossed Centerline 5% Involve a first unit event of Collision with Pedestrian	71% Involve a first unit event of Motor Vehicle in Transport 11% Involve a first unit event of Collision with Pedestrian 8% Involve a first unit event of Ran Off the Road (Right)	50% Involve a first unit event of Motor Vehicle in Transport 17% Involve a first unit event of Collision with Pedestrian 17% Involve a Other Non-Collision	46% Involve a first unit event of Ran Off the Road (Left) 15% Involve a first unit event of Equipment Failure 8% Involve a first unit event of Collision with Fixed Object	75% Involve a first unit event of Motor Vehicle in Transport 8% Involve a first unit event of Collision with Pedestrian 8% Involve a first unit event of Overturn	71% Involve a first unit event of Motor Vehicle in Transport 6% Involve a first unit event of Collision with Fixed Object 6% Involve a first unit event of Overturn	64% Involve a first unit event of Motor Vehicle in Transport 9% Involve a first unit event of Crossed Centerline 7% Involve a first unit event of Collision with Pedestrian
	Driver Physical Condition	70% No Apparent Influence 10% Physical Impairment 10% Under the Influence of Drugs or Alcohol	74% No Apparent Influence 14% Under the Influence of Drugs or Alcohol 5% Unknown	58% No Apparent Influence 18% Under the Influence of Drugs or Alcohol 16% Unknown	33% Under the Influence of Drugs or Alcohol 33% Unknown 17% Fatigued/Fell Asleep	54% No Apparent Influence 23% Under the Influence of Drugs or Alcohol 23% Unknown	83% No Apparent Influence 8% Under the Influence of Drugs or Alcohol 8% Unknown	59% No Apparent Influence 24% Unknown 18% Under the Influence of Drugs or Alcohol	65% No Apparent Influence 16% Under the Influence of Drugs or Alcohol 13% Unknown
	Safety Device Usage	80% Shoulder And Lap Belt Used 10% Air Bag Deployed/Shoulder-Lap Belt 10% Not Applicable	68% Shoulder And Lap Belt Used 11% None Used 9% Air Bag Deployed/Shoulder-Lap Belt	63% Shoulder And Lap Belt Used 18% None Used 11% Air Bag Deployed/Shoulder-Lap Belt	33% None Used 17% Not Applicable 17% Unknown	31% Helmet Used 23% Unknown 23% Shoulder And Lap Belt Used	42% Shoulder And Lap Belt Used 25% None Used 8% Helmet Used	59% Shoulder And Lap Belt Used 12% Air Bag Deployed/Shoulder-Lap Belt 12% Not Applicable	59% Shoulder And Lap Belt Used 15% None Used 9% Air Bag Deployed/Shoulder-Lap Belt

Segment Number	95N-1	95N-2	95N-3	68-4	68-5	68-6	68-7	Corridor-Wide Crash Characteristics
Segment Length (miles)	7	8	9	7	10	5	5	
Segment Milepost (MP)	226-233	233-241	241-250	0-7	7-17	17-22	22-27	
Final Need	Low	High	High	High	High	High	High	
Segment Crash Overview	**1** Crash was fatal **9** Crashes had incapacitating injuries **1** Crash involves trucks **2** Crashes involve pedestrians/bikes **0** Crashes involve motorcycles	**7** Crashes were fatal **50** Crashes had incapacitating injuries **4** Crashes involve trucks **4** Crashes involve pedestrians/bikes **4** Crashes involve motorcycles	**10** Crashes were fatal **28** Crashes had incapacitating injuries **2** Crashes involve trucks **4** Crashes involve pedestrians/bikes **2** Crashes involve motorcycles	**2** Crashes were fatal **4** Crashes had incapacitating injuries **0** Crashes involve trucks **2** Crashes involve pedestrians/bikes **0** Crashes involve motorcycles	**7** Crashes were fatal **6** Crashes had incapacitating injuries **0** Crashes involve trucks **0** Crashes involve pedestrians/bikes **9** Crashes involve motorcycles	**4** Crashes were fatal **8** Crashes had incapacitating injuries **2** Crashes involve trucks **2** Crashes involve pedestrians/bikes **1** Crash involves motorcycles	**8** Crashes were fatal **9** Crashes had incapacitating injuries **1** Crash involves trucks **3** Crashes involve pedestrians/bikes **2** Crashes involve motorcycles	39 Crashes were fatal 114 Crashes had incapacitating injuries 10 Crashes involve trucks 17 Crashes involve pedestrians/bikes 18 Crashes involve motorcycles
Hot Spot Crash Summaries	MP 226-227	MP 234-241	MP 241-250		MP 8-11	MP 17-20; 21-22	MP 22-27	
Previously Completed Safety-Related Projects			Lighting and Pedestrian Safety improvements, Thunderstruck Drive to 7th Street (MP 244.2-248.9), 2012-2013; Intersection improvements, 2015 (MP 249.8); Roadway improvements (paving and new curbs, gutters, sidewalks, and raised medians), 2017 (Aviation Way [MP 249.5) to Laughlin Bridge [MP 250.0])			Construct turn lanes, MP 19.8 (2016)		
District Interviews/Discussions	Lack of access control, numerous driveways, and speeding contribute to safety issue	Lack of access control, numerous driveways, speeding, and high volumes contribute to safety issue	Lack of access control, numerous driveways, speeding, high volumes, and disregard for traffic signals contribute to safety issue	Speeding contributes to safety issue	Speeding, especially by motorcycles, contributes to safety issue	Lack of access control, numerous driveways, and speeding contribute to safety issue	Lack of access control, numerous driveways, and speeding contribute to safety issue	Lack of access control, numerous driveways, and speeding contribute to safety issue
Contributing Factors	-Speed too fast for conditions -Driver inattention/ distraction -Lack of crossing opportunity for pedestrians -Misjudgment of speed of oncoming traffic -Unexpected stops	-Poor nighttime visibility or lighting -Uncontrolled access -Lack of median barrier -Speed too fast for conditions -Driver inattention/distraction -Lack of crossing opportunity for pedestrians -Misjudgment of speed of oncoming traffic -Unexpected stops -Lack of traffic signal coordination	-Poor nighttime visibility or lighting -Uncontrolled access -Lack of median barrier -Failure to yield right-of-way -Disregard of traffic signal -Driver inattention/distraction -Lack of crossing opportunity for pedestrians -Misjudgment of speed of oncoming traffic -Unexpected stops -Lack of traffic signal coordination -Not wearing seatbelt -Driving under the influence	-Poor nighttime visibility or lighting -Slippery pavement -Driver inattention/ distraction -Lack of crossing opportunity for pedestrians -Speed too fast for conditions -Unexpected stops -Not wearing seatbelt -Driving under the influence	-Poor nighttime visibility or lighting -Slippery pavement -Driver inattention/ distraction -Speed too fast for conditions -Inadequate roadway shoulders -Not wearing helmet -Driving under the influence	-Poor nighttime visibility or lighting -Uncontrolled access -Lack of median barrier -Speed too fast for conditions -Driver inattention/ distraction -Lack of crossing opportunity for pedestrians -Misjudgment of speed of oncoming traffic -Unexpected stops -Not wearing seatbelt	-Poor nighttime visibility or lighting -Uncontrolled access -Lack of median barrier -Speed too fast for conditions -Driver inattention/ distraction -Lack of crossing opportunity for pedestrians -Misjudgment of speed of oncoming traffic -Unexpected stops -Driving under the influence	-Poor nighttime visibility or lighting -Uncontrolled access -Lack of median barrier -Speed too fast for conditions -Driver inattention/ distraction -Lack of crossing opportunity for pedestrians -Misjudgment of speed of oncoming traffic -Unexpected stops -Driving under the influence -Not wearing seatbelt

Freight Performance Needs Analysis

Segment #	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Roadway Variables								Traffic Variables					Relevant Freight Related Existing Infrastructure
				Functional Classification	Environmental Type (Urban/Rural)	Terrain	# of Lanes/ Direction	Speed Limit	Aux Lanes	Divided/ Non-Divided	% No Passing	Existing LOS	Future 2035 LOS	% Trucks	NB/EB Buffer Index (TPTI-TTTI)	SB/WB Buffer Index (TPTI-TTTI)	
95N-1	226-233	6.92	None	State Highway	Rural	Level	2	35-55	No	Non-Divided	0%	E/F	E/F	16%	1.07	0.57	Traffic signals at following locations: MPs 227.28, 229.30, 230.30 and 231.30
95N-2	233-241	8	Low	State Highway	Fringe Urban	Level	4	45-55	No	Non-Divided	0%	D	E/F	13%	3.01	2.66	Traffic signals at following locations: MPs 234.40, 235.27, 235.40, 236.38, 237.42, 237.85, 238.42, 240.40 and 240.70
95N-3	241-250	9	High	State Highway	Fringe Urban	Level	4	45	No	Non-Divided	0%	E/F	E/F	6%	5.44	5.72	Traffic signals at following locations: MPs 241.16, 242.20, 242.55, 242.80, 243.42, 243.94, 244.18, 244.41, 244.94, 245.30, 245.60, 246.08, 246.58, 247.55, 247.95, 248.47, 249.40, 249.60, and 249.81;
68-4	0-7	7	Low	State Highway	Rural	Mountainous	4	45-65	No	Both	0%	A-C	A-C	14%	0.94	3.87	Runaway truck escape ramp WB MP 1.3; Runaway truck escape ramp WB MP 5.8; Traffic signal at MP 0.75
68-5	7-17	10	High	State Highway	Rural	Mountainous	4	65 (Truck 50 WB)	No	Divided	0%	A-C	A-C	20%	0.77	1.43	Safety pullout WB MP 11.9; Formal pullout WB MP 13.9
68-6	17-22	5	High	State Highway	Fringe Urban	Level	4	65	No	Divided	0%	A-C	A-C	22%	0.41	0.71	
68-7	22-27	5.11	Low	State Highway	Fringe Urban	Level	4	45-55	No	Non-Divided	0%	A-C	A-C	20%	0.24	0.45	DMS EB MP 26.4

Freight Performance Needs Analysis (continued)

Segment #	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Closure Extent							Non-Actionable Conditions	Programmed and Planned Projects or Issues from Previous Documents Relevant to Final Need	Contributing Factors
				Total Number of Closures	# Incidents/ Accidents	% Incidents/ Accidents	# Obstructions/ Hazards	% Obstructions/ Hazards	# Weather Related	% Weather Related			
95N-1	226-233	6.92	None	12	11	92%	1	8%	0	0%			Percentage of closures due to obstructions/hazards above the statewide average (8% to 3%)
95N-2	233-241	8	Low	60	58	97%	2	3%	0	0%		Drainage improvements, 2012, SR 95/Joy Lane (MP 236-236.45) Construct raised median, Teller Road to Aztec Road (programmed design in 2018, construction in 2019); Construct roundabout, Aztec Road MP 237.9 (programmed design in 2018, construction in 2019) Construct raised median, Aztec Road to Valencia Road (programmed design in 2018, construction in 2020); Construct roundabout, Camp Mohave Road MP 238.3 (programmed design in 2018, construction in 2019)	Percentage of closures due to incidents/accidents above the statewide average (97% to 96%); percentage of closures due to obstructions/hazards above the statewide average (4% to 3%)
95N-3	241-250	9	High	32	30	94%	2	6%	0	0%			Percentage of closures due to obstructions/hazards above the statewide average (6% to 3%)
68-4	0-7	7	Low	15	15	100%	0	0%	0	0%			Percentage of closures due to incidents/accidents above the statewide average (100% to 96%)
68-5	7-17	10	High	17	16	94%	0	0%	1	6%			Percentage of closures due to weather above the statewide average (6% to 1%)
68-6	17-22	5	High	10	9	90%	0	0%	1	10%			Percentage of closures due to weather above the statewide average (10% to 1%)
68-7	22-27	5.11	Low	22	22	100%	0	0%	0	0%			Percentage of closures due to incidents/accidents above the statewide average (100% to 96%)

Needs Summary Table

Performance Area	Segment Number and Mileposts (MP)						
	95N-1	95N-2	95N-3	68-4	68-5	68-6	68-7
	MP 226-233	MP 233-241	MP 241-250	MP 0-7	MP 7-17	MP 17-22	MP 22-27
Pavement*	Low	Medium	Low	None	None	Low	None
Bridge	High	None	High	None	None	None	None
Mobility*	Medium	High	High	Low	Low	Low	Low
Safety*	Low	High	High	High	High	High	High
Freight	None	Low	High	Low	High	High	Low
Average Need	**1.38**	**2.00**	**2.54**	**1.08**	**1.38**	**1.62**	**1.08**

* Identified as Emphasis Areas for SR 68/SR 95 North Corridor
[#] N/A indicates insufficient or no data available to determine level of need
[+] A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study

Level of Need	Average Need Range
None[+]	< 0.1
Low	0.1 - 1.0
Medium	1.0 - 2.0
High	> 2.0